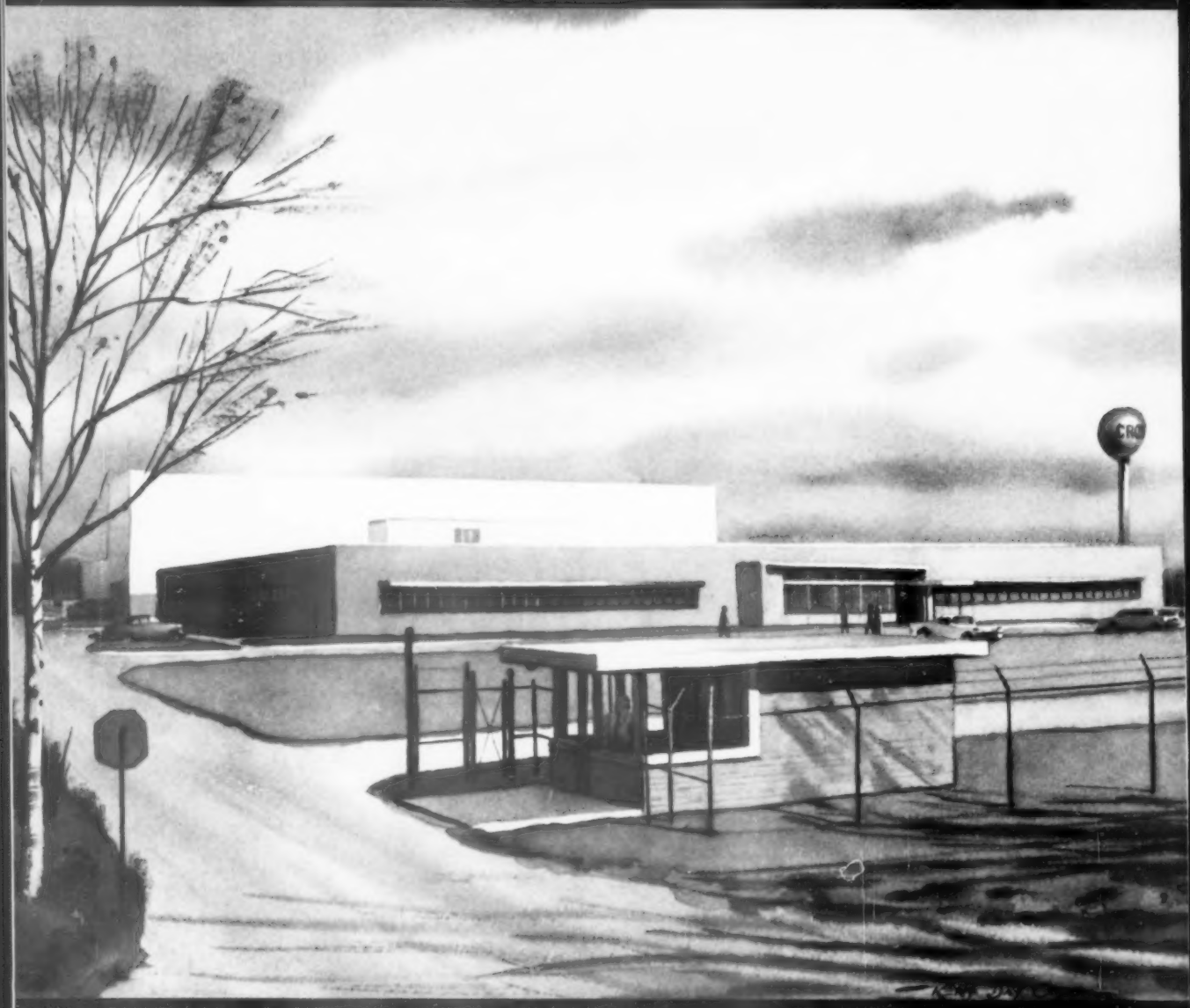
FACTORY

BETTER PRODUCTION AND MAINTENANCE THROUGH BETTER MANAGEMENT



Original watercolor: The Cross Company's big, imposing plant at Fraser, Mich.

MARCH 1959

PRICE ONE DOLLAR

A McGRAW-HILL PUBLICATION

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How it grew up, where it stands, where it's headed

NEW APPROACH TO METHODS IMPROVEMENTS . . . . . p. 78

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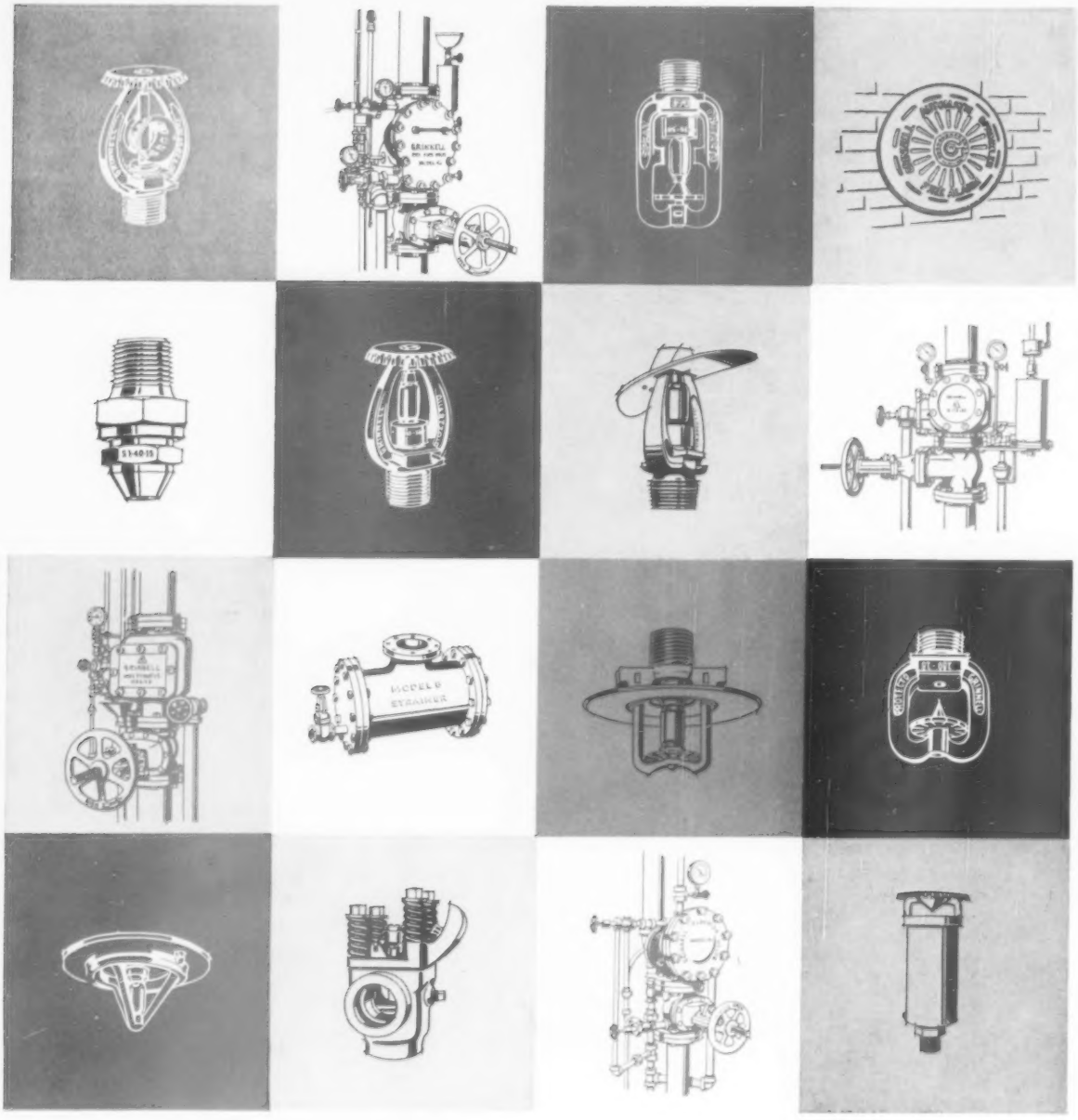

the best fire protection money can buy!

Most people think that all automatic sprinkler systems are much the same... but nothing could be further from the truth. They vary in durability, reliability and the speed with which they apply water to the fire. ✓ ✓ ✓ During the past 89 years of research and development Grinnell has invented and perfected sprinkler heads, nozzles, projectors, release devices, alarms, valves and other components for practically every conceivable need. When these are incorporated into fire protection systems executed in accord with Grinnell research and experience, engineered to **your** special needs, fabricated in Grinnell shops, and installed by expert Grinnell erection crews... you have protection which no ordinary sprinkler system can match. Let Grinnell recommend the best system for you. Write Grinnell Company, Inc., Providence 1, R.I., or to the Grinnell Fire Protection office near you.

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B.F.Goodrich

SUCCESS STORIES

B.F.Goodrich distributors helped these customers cut costs. Can they help you?

Filling station for fire water

(See photo) In Rhode Island, a manufacturer of dyes and finishes for fine fabrics, uses strong sulphuric acid by the tankload. It's pumped from truck to storage tank through hose. But the acid is so strong and corrosive, it would eat its way through regular rubber hose. Metal tubing couldn't take the sharp angles or stand much bending.

When a B.F.Goodrich distributor heard of the problem, he recommended a new hose, specially developed by B.F.Goodrich for acid-handling service. The lining of this hose is made with a special compound, called "Hypalon," which stands those strong acids and chemicals that destroy ordinary rubber.

The B.F.Goodrich acid hose shown above has already lasted a year and a half, is still in excellent condition. It has put an end to the waste and danger of acid leaks, the cost of frequent hose replacements. It's lighter, easier to handle than the hose used previously; faster to hook up because of special attachments at the hose ends.

Ground trip

A brick manufacturer in Virginia uses a B.F.Goodrich Highseal conveyor belt to carry rejected raw bricks back to a pug mill to be ground up for re-use. An oil-resisting belt was needed because a certain amount of oil is added to the clay. At first, the distributor questioned the use of Highseal because it was regarded as a lightweight belt for food handling only, but after a year passed, he reported it had outlasted the previous belt. Now after nearly four years of six-day-a-week service, the B.F.Goodrich belt is still in use and shows very little wear.

Rundown feeling

In Illinois, rubber suction hose, reinforced with wire, was being used to drain big pools of water that accumulate in an underground coal mine. But after being run over several times by heavy mining equipment, the hose was crushed flat, had to be replaced.

In 1953, the company switched to a different kind of water suction hose, developed by B.F.Goodrich. Instead of wire, this hose is reinforced with a continuous coil of hemp rope, buried in thick rubber, so it springs back to its round shape after being crushed. In spite of being run over countless times by shuttle cars and other equipment, this B.F.Goodrich hose lasts four times as long as the hose used before, saves the mine an estimated 75% in maintenance costs.

Smooth take-off

For many years an eastern gelatin manufacturer used cotton duck conveyor belts for "take-off" operations. Then a B.F.Goodrich distributor sold the company a lightweight belt made of Koroseal flexible material. It worked so well that five more B.F.Goodrich Koroseal belts were installed recently. Distributor reports that these belts not only do a better job, but are also more economical.

Chute works

A mining company in Michigan recently ordered Grade 1172 rubber sheeting from a B.F.Goodrich distributor for lining slurry chutes. Choice was made after company had made a special test in which this rubber outlasted another material.

Face lifting

A manufacturer of television sets uses a lift truck with a carton clamp device to pick up boxed sets. To prevent slippage and damage to packages, a distributor suggested that the company use pieces of B.F.Goodrich Ribflex conveyor belting to cover the face plates of the clamp. The cover of this belting is made of parallel ribs of flexible rubber, which provide a good surface for gripping smooth boxes.

New product

Rubber dock bumpers: Tough rubber pads for use on all types of loading docks to protect trucks and platforms

from damage. Bumpers resist impact, abrasion, scuffing, weather. Two types: one all rubber, the other with a metal backing. Ask your B.F.Goodrich distributor for Information Bulletin 758-1.

For more information

For full information about any product described on this page, see your B.F.Goodrich distributor or write *B.F.Goodrich Industrial Products Co., Dept. M-543, Akron 18, Ohio.*

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Edited exclusively for the men with management responsibilty for production and maintenance in the manufacturing industries

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Note: For suggestions on using this new tool (plus an outline for a more complete decimal filing system), see FACTORY, February 1957, page 104.

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1.2 Buildings and Yards

1.3 Services and Facilities

1.4 Electrical Services

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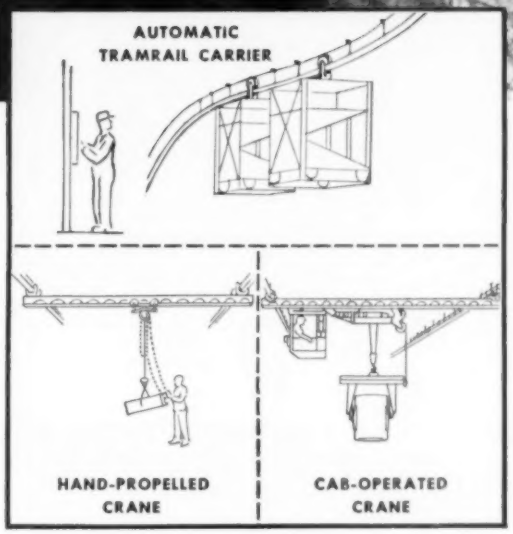

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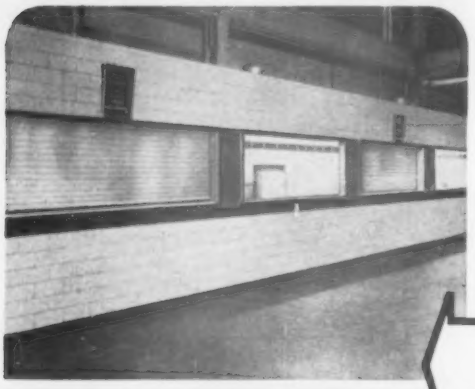

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The vertical "coil-away" action of the *Kinnear-originated* curtain of interlocking metal slats is the ideal counter shutter. Its space-saving efficiency and protection have been proved in service openings of every kind. In addition to a variety of contoured slats, Kinnear also offers the popular "midget" slat, with a flat exterior face, specially designed for counters up to 20 feet wide.

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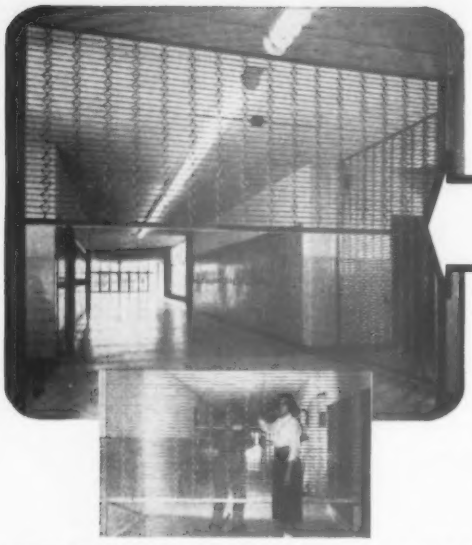

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FACTORY LETTERS

WHO'S NAIVE?

Sir:

The article ("Rate of Return—Toughest Measure of a Manager" by L. G. Smiley, FACTORY, Nov. 1958, page 90) is not one that really impressed me. Probably the most serious criticism is that the author conveys the impression he has distilled all the thinking on all the topics he mentions into something useful and meaningful.

The article seems to be the type that business publications pass off as "learned." For me it fails on two counts: as a directed communication and as an analytic document.

It's directed to no one. To one familiar with the topic, there is considerable doubt that this contributes to existing knowledge. There is also some question as to how well parts are thought through, particularly estimates of future cash flows. The "Cost of Money Rate" section (page 99) is appallingly naive. If one knows nothing of the topic, the article does not appear helpful since it only raises some of the questions, and does nothing to suggest where or how to look for answers. It most certainly is not a "cook book." I expect it may be satisfactory to the readership of popular "business" magazines. Thus it could be excused as being general enough to preclude serious argument from the "informed" or serious confusion among the "uninformed."

Turn the page

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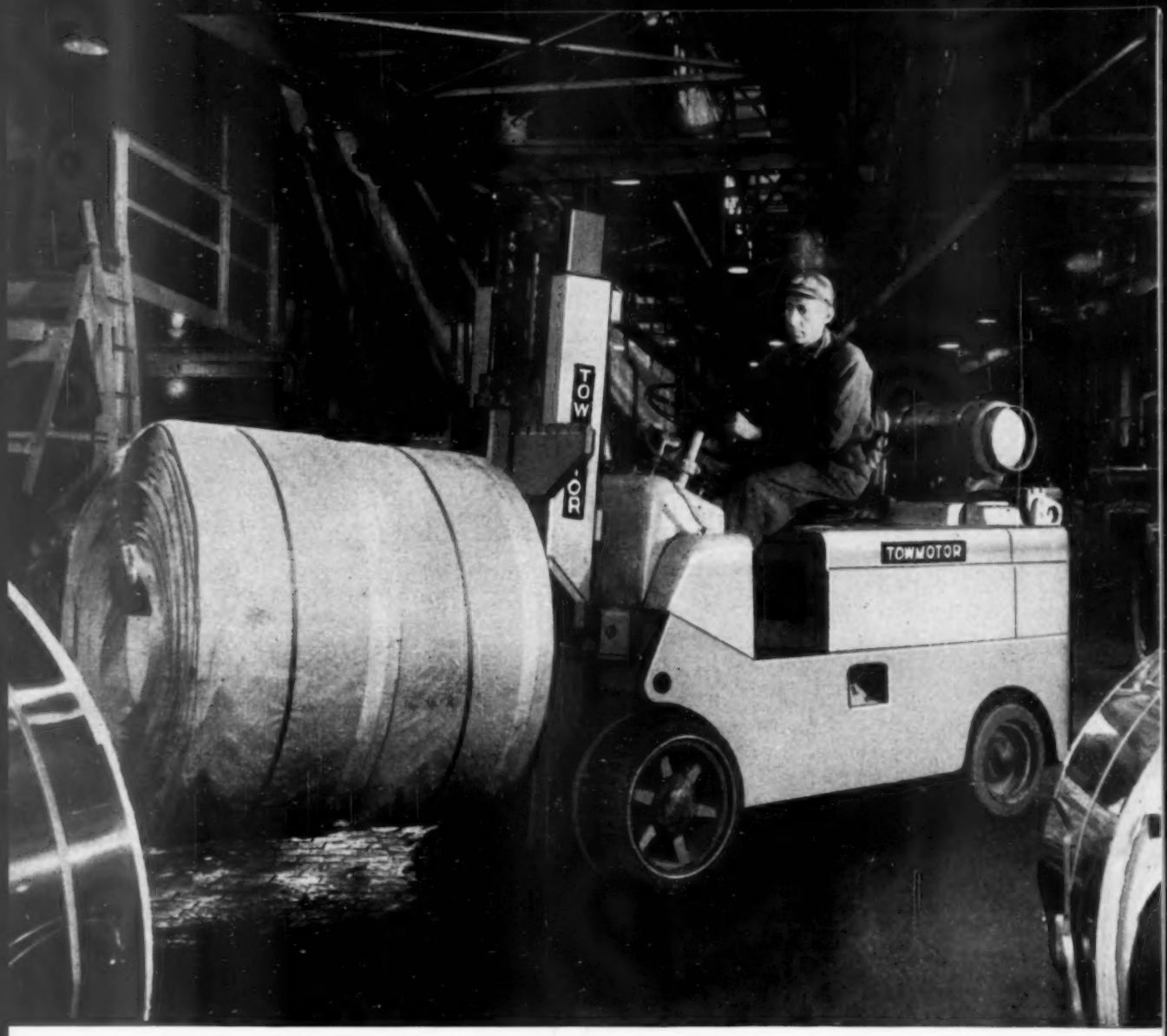

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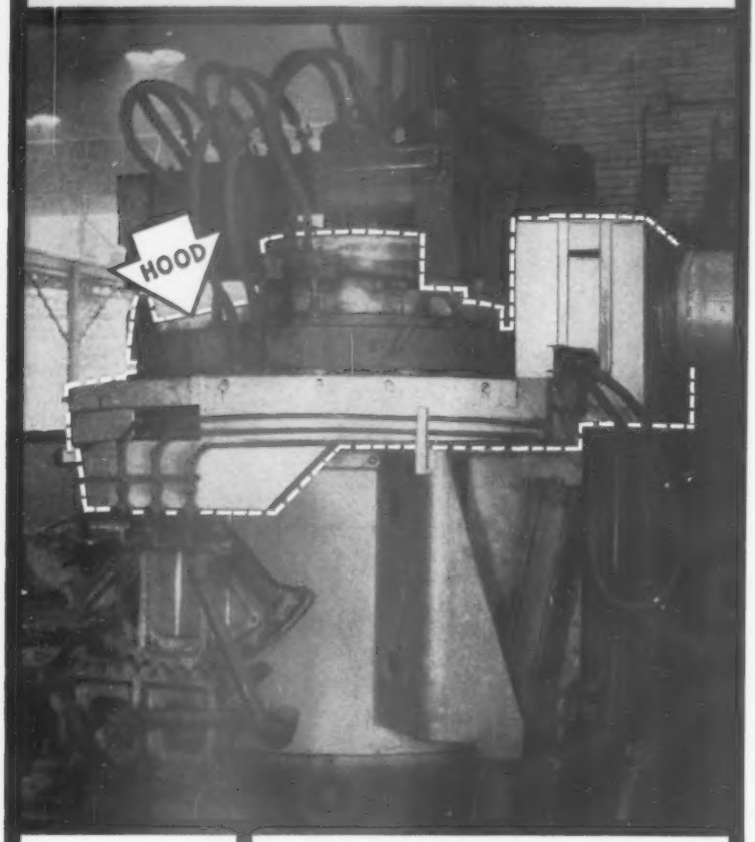

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Pangborn CONTROLS DUST

Begins on page 8

As to analytic strength, there is little or no real analysis, although statements of advantages and disadvantages could suggest there is analysis. However, these pro and con statements are superficial and far from exhaustive.

Finally, although the article starts on "roughest measure *of*," it covers the "toughest measure *for*." This proves the difficulty of making the measure by glibly setting up hows, pros and cons.

Anonymous

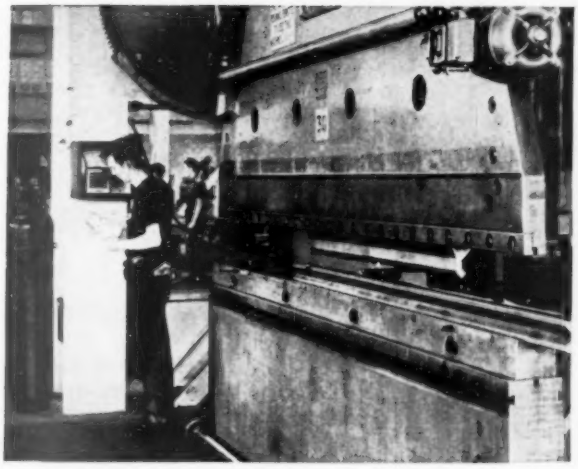
► Normally, FACTORY will not publish anonymous communications. However, we have made an exception for the above letter because it was forwarded by the article's author, to whom it had been forwarded by a known intermediary. We feel that our readers would like to see the letter because we are told its writer is a faculty member of one of the country's great universities. That such a careless, thoughtless letter could be written by an apparently respected member of a university's faculty is of serious concern to us.

We are especially concerned and incensed at the writer's condescending reference to "the readership of popular 'business' magazines." He apparently forgets that the readers of popular business magazines remain loyal only because those magazines supply them with useful information needed to solve problems. By "popular" we assume the writer means that material that appears in such publications is in plain English that everybody can understand, and devoid of bad writing and confused organization.

Furthermore, we put this particular correspondent in the class of a badly informed critic. For example, his comment on the "Cost of Money Rate" section indicates he, and not the author of our article, is appallingly naive. He fails to remember, or does not know, that this is the basis for the famous MAPI formula and for the practices of many successful companies. These companies can hardly be called naive, nor can the Machinery and Allied Products Institute.—ED.

Turn the page

How Canadian General Electric Gets Up-to-the-Minute Cost Data at Less Expense!



When starting and finishing a job, employee talks into nearby Executone, reporting clock number, job, and machine numbers to centralized timekeeping office. No time is lost walking to make reports, waiting in line, visiting with friends.

When call comes in, girl records all data on prepunched cards. Data is processed and analyzed by management within hours instead of weeks. Errors are spotted quickly, corrective action can be taken while job is still running.

Executone reduces time lag by two weeks— Savings more than pay for system!

At the Canadian General Electric plant at Guelph, Ontario, Executone Centralized Timekeeping has proved itself an invaluable management tool—

- Three girls now handle the work. Elimination of in-plant timekeeping released eight employees for other duties.
- Labor costs are compiled within 24 hours instead of two weeks.
- Employees gain productive time because less time is lost walking, waiting and visiting when making job reports.
- Down time is cut. Machine breakdown, lack of materials, etc., are reported immediately. Corrective action is taken while job *is still running.*
- CGE has gained 700 sq. ft. additional production space by eliminating Timekeeping Centers.

Executone Can Do It For You!

With Executone, data gathering becomes an easy way to obtain your labor cost information at the source and channel it directly from the factory floor to a centralized timekeeping office in a matter of *seconds.* No matter what the size of your operation, your local Executone man can help you plan a system to fit your exact requirements. For full information, send coupon below today.

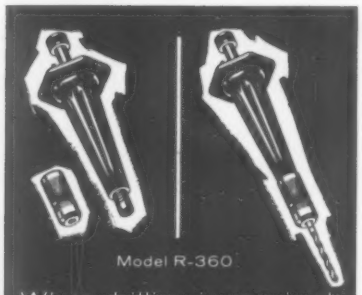
Executone, Inc., Dept. X-5, 415 Lexington Ave., N.Y. 17, N.Y.
Without obligation, please send me the following Centralized Timekeeping Information:

☐ Production Control ☐ Incentive Plan Control
☐ Cost Control ☐ Other Case Histories
☐ Name of Local Representative

Name_____
Company_____
Address_____
City_____ Zone____ State_____
In Canada—331 Bartlett Ave., Toronto

Executone
CENTRALIZED TIMEKEEPING SYSTEMS

COUNT ON SHURE-SET

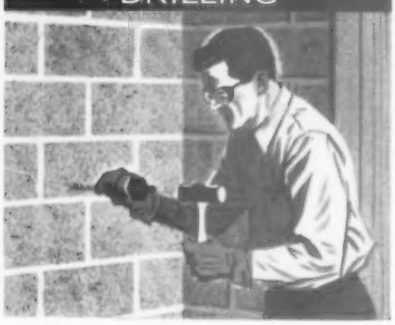


Model R-360

When drilling is required, simple adapter converts tool for use as drill

FASTENING

DRILLING



most versatile light-fastening tool ever created

2 x 4's to masonry . . . steel to steel . . . wood to concrete . . . no matter what the fastening job, Shure-Set hammer-in tool and job-fitted austempered fasteners are always ready-to-go. And no cartridge is required! Easier and quicker on any fastening assignment, Shure-Set is a "must" for every maintenance department. Eliminates drilling, filling and plugging when setting drive pins, threaded studs or wire loops. A complete selection of fasteners assures the "right" one every time! Check into the time- and money-saving aspects of Shure-Set today—look under "Tools" in the Yellow Pages.

In addition to hammer-in Shure-Set, the versatile Ramset Fastening System includes Ramset powder-actuated tools for heavy-duty fastening, and Ringblaster heavy-duty kiln gun.

OLIN MATHIESON CHEMICAL CORPORATION

Shure-Set®

Ramset® Fastening System

WINCHESTER-WESTERN DIVISION · OLIN MATHIESON CHEMICAL CORPORATION
12155-C BEREA ROAD · CLEVELAND, OHIO

FACTORY / LETTERS

Begins on page 8

HOW MUCH SAVINGS?

Sir:

At present I am particularly interested in Preventive Maintenance. Your survey "Maintenance Management Practices in Industry Today" (September 1958, page 90) revealed PM costs about 20% of total maintenance bills. Do you have any information on the savings plants are attributing to PM? Are there any suggested curves that could show at the end of a year what PM is saving in dollars and cents?

Henry Boehl, Jr.
Maintenance Engineer
Plant Facilities Section
American-Standard Plumbing and Heating Division
Louisville 8, Ky.

► We wish we could answer your questions on PM savings as specifically as we reported PM costs in our recent survey on maintenance practices. But we have no pattern of savings to report. However, our article "Preventive Maintenance" (September 1956, page 114) spells out where savings would occur—but it doesn't state how much they are.

We don't know what you are trying to prove from a set of curves. So please beware. Reason: The same set of conditions rarely holds true for two different plants. Thus savings could—and probably would—vary widely.—ED.

MORE DATA WANTED

Sir:

In your December issue (page 114) the feature "You Be the Arbitrator" briefed a case credited to the American Arbitration Association. Could you please give us the name of the company involved or the name of someone at the American Arbitration Association with whom we could communicate to obtain the full text of this case?

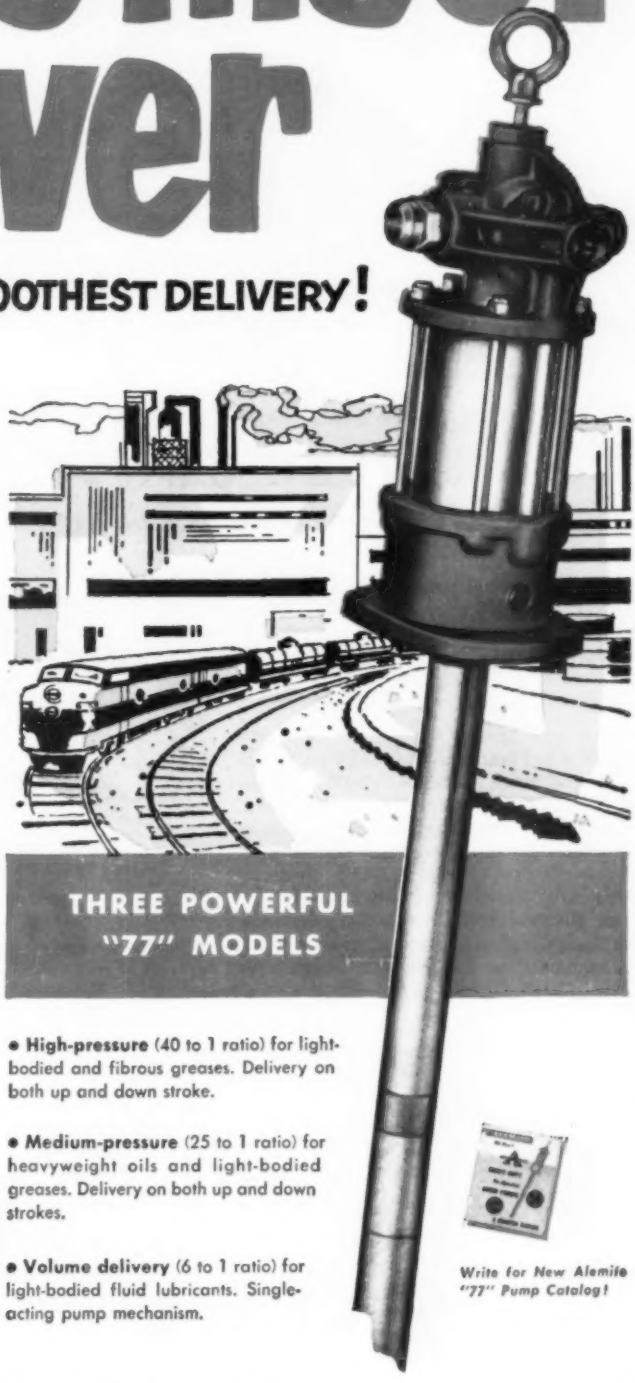
E. M. Britt
Assistant Superintendent
Labor Relations
Western Electric Co., Inc.
Winston-Salem, N. C.

► Sorry, company names are purposely withheld in "You Be the Arbitrator" cases to protect the in-

ALL-NEW ALEMITE "77" LUBRICANT PUMP

packs most power

FOR SMOOTHEST DELIVERY!



68% More Powerful . . . outperforms any other air-operated lubricant pump of its class on the market today! The all-new 5.2 horsepower Alemite "77" Pump assures smoothest, fastest delivery of all lubricants, through longest lines!

Three Master Pressure Ratios for unequalled delivery of all lubricants – fluid, semi-solid and heavy fibrous types. Lightweight, rust-proof aluminum construction.

Precision Engineered from finest quality materials–designed for outstanding ease of operation and maximum performance. Models for 120-lb. or 400-lb. drums – for all industrial applications.

All-New Alemite "77" Features!

• **Volume Air Distributing Valve**—self-seating, self-cleaning, volume porting • **Modern-Design, Highly Efficient Toggle Trip Mechanism** provides balanced pressure on shuttle . . . won't bind • **Straight-Line Exhaust** has extra-large port for highest pump efficiency • **Hardened Steel Piston and Cylinder,** lapped to a precision fit of 125 millionths of an inch • **All-Steel Primer Valve,** ground to a perfect seal . . . hardened for abrasion resistance • **Dynamic Primer** assures priming and pumping of heaviest lubricants.

THREE POWERFUL "77" MODELS

• **High-pressure** (40 to 1 ratio) for light-bodied and fibrous greases. Delivery on both up and down stroke.

• **Medium-pressure** (25 to 1 ratio) for heavyweight oils and light-bodied greases. Delivery on both up and down strokes.

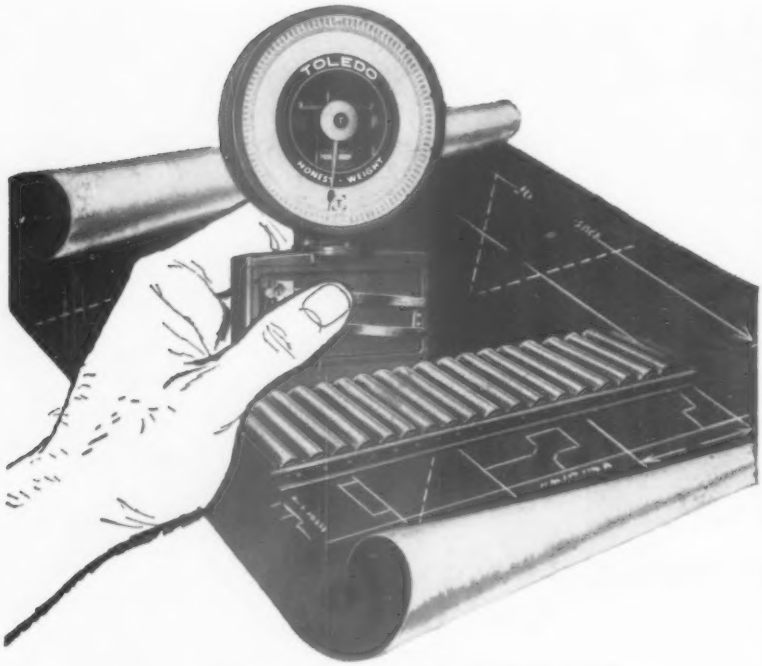
• **Volume delivery** (6 to 1 ratio) for light-bodied fluid lubricants. Single-acting pump mechanism.

Write for New Alemite "77" Pump Catalog!

Symbol of SW Excellence

ALEMITE
DIVISION
STEWART-WARNER
CORPORATION

Dept. E-39, 1850 Diversey Parkway, Chicago 14, Illinois



the cost-saving trend today puts BETTER CONTROL where it counts most!

On industry's scales, materials become money. Weight records directly affect costs, quality, inventories and customer billing. That's why it is so vitally important to put *Toledos* at all weighing points . . . where control counts most!

Major advantages that are yours with Toledos are being proven daily in plants of every size. Toledos provide more complete cost data . . . greater selection of models . . . savings in time and materials . . . welcome new simplification of records and record keeping. You can even carry Toledo accuracy directly into your accounting and inventory records, through weights printed at the scale, or transmitted on "electronic wings" for remote recording.

There are specialized Toledo units, too, for classifying, testing, counting, automatic batching and bulk weight control. So, whatever your weighing need, you need Toledos. To help you evaluate weighing efficiency in your plant, send for the Toledo weighing analysis kit. No obligation. TOLEDO SCALE, Division of Toledo Scale Corporation, Toledo 12, Ohio.

NEW TOLEDO PRINTWEIGH® "400"

. . . complete printed weight records at your fingertips!

- Prints where you wish on full 8½″ x 11″ forms, or on tickets; also on strips.
- Prints full figures, even when unit weights are used.
- 6 to 12 bank selective numbering, or up to 10 weight symbol keys available for weight identification. Consecutive numbering.
- Date and time may be printed automatically.
- Transmits weight data for recording by remotely located office machines, if desired.

Ask for Bulletin 2017

SERVICE Factory-Trained 240 Cities

TOLEDO®

Greatest Name in Weighing

For more facts Circle 458 on Reader Service Card

FACTORY / LETTERS

Begins on page 8

nocent. However, if you will contact Mr. Morris Stone, Public Relations Manager of the American Arbitration Association, 477 Madison Ave., New York 22, we are sure he will be happy to supply you with any additional facts that are available in these cases.—ED.

SELLING IDEAS

Sir:

The article "How You Can Sell Modernization Ideas Up the Line" in the November issue of FACTORY (page 100) strikes me as not only timely for the particular subject, but also of considerable value as a refresher to even the best of salesmen. We are pursuing modernization further in 1959.

George B. Catlin
Senior Industrial Sales Engineer
The Detroit Edison Co.
Detroit 26

► Many thanks for the bouquet. We also thought the selling aspects of modernization important. Reprints of the entire November modernization section are available at $1 each. Just write: Reader Service Dept., FACTORY, 330 West 42nd St., New York 36.—ED.

ONE WE MISSED

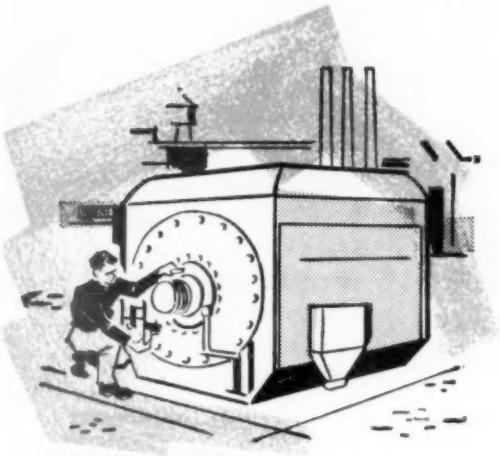
Sir:

As a regular reader, I'm surprised you failed to review the book *As Unions Mature: An Analysis of the Evolution of American Unionism,* (Princeton University Press). This important new book on the labor movement theory should be of great interest to your readers.

Arthur B. Shostak
Princeton, N. J.

► We are sorry, too, that we did not see a copy of *As Unions Mature* for review. We try to keep up to date on all newly published works. However, it is almost impossible to see every book published in our field. Our principal sources of books for review are copies sent us by publishers or newly published works recommended to us by friends. We are delighted to have your reaction on this one.—ED.

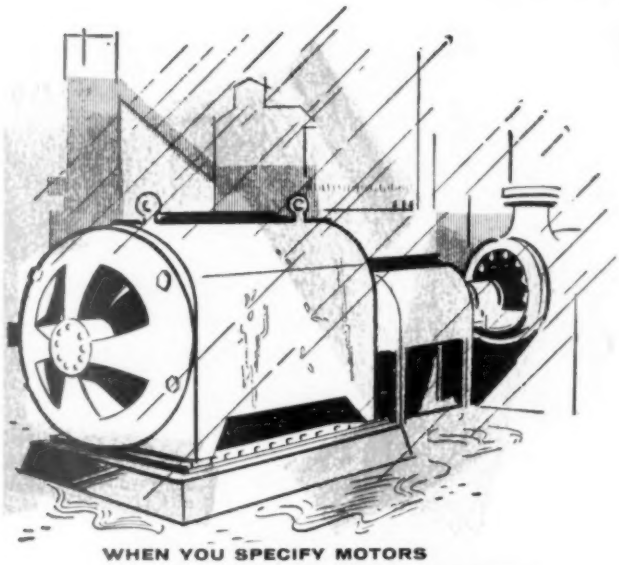
NO NEED TO SHELTER
MOTORS IN BUILDINGS . . .



OR SEAL MOTORS
INSIDE COSTLY ENCLOSURES . . .

HERE'S WHY . . .

YOU SAVE BY SPECIFYING SILICONE INSULATED MOTORS FOR OUTDOOR SERVICE



WHEN YOU SPECIFY MOTORS
INSULATED WITH WEATHER-RESISTANT
DOW CORNING SILICONES

Weather-resistant silicone insulated motors cost substantially less than other motors built for outdoor service. The reason: much lower enclosure costs because of self-protecting insulation systems made from Dow Corning silicone rubber.

Year 'round operation outdoors. Specify open frames . . . there's no need to protect the insulation. Silicone rubber insulated motors withstand torrential rains, hurricane winds, corrosive fumes, dust, snow, sleet, cold, heat . . . even flooding. An increasing number of equipment manufacturers now offer these "all weather" silicone-insulated motors in large horsepower ratings.

Unbeatable reliability is assured by the motor's silicone insulation systems. The greater thermal stability of silicones means increased service factors, greater overload capacity . . . and increased insulation life.

Send today for Free Booklet detailing how you can use silicone insulated equipment for greater reliability at less cost.

Specify
DOW CORNING SILICONES
and *Save*

first in silicones

Dow Corning CORPORATION
MIDLAND, MICHIGAN

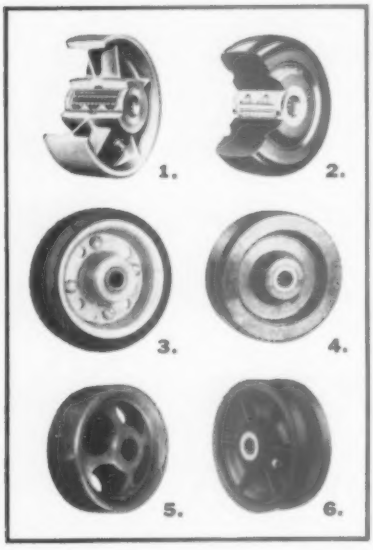
ATLANTA BOSTON CHICAGO CLEVELAND DALLAS LOS ANGELES NEW YORK WASHINGTON, D. C.

MATERIALS-HANDLING NEWS

NEW AND UNUSUAL APPLICATIONS OF BASSICK CASTERS THAT MIGHT BE ADAPTED TO YOUR HANDLING PROBLEMS

Convenient caster refinements open up new ways to efficient, low-cost materials-handling

Modern Bassick casters have brakes, grooved wheels, shock absorption, sealed bearings, varied attachments, accessories



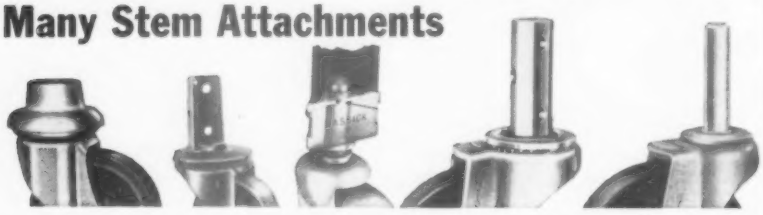
WHEELS FOR EVERY JOB, EVERY LOAD, EVERY FLOOR

Industrial caster wheels have come a long way from the original cast iron design. Today, you may choose (by the numbers at left):

1. Semi-steel wheels for heavy duty over rough floors. **2.** "Atlasite" hard composition wheels for increased floor protection. **3.** Demountable rubber tired wheels with bolted steel discs. **4.** Acid- and heat-resistant phenolic-mascerated canvas composition wheels. **5.** "Biron" powdered metal wheels with self-lubricating bearings. **6.** V-grooved wheels which operate both on inverted angle iron tracks and floors. And several others not shown.

Four types of wheel bearings are also available depending on the application: ball bearings, standard roller bearings, self lubricating bearings and tapered roller bearings.

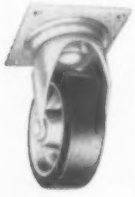
Many Stem Attachments



Stem casters are more suitable than plate casters for certain types of equipment. Bassick offers threaded pipe socket, iron angle plate, rivetless angle iron sockets, octagon and plain round stems (left to right, respectively) and others for all manner of equipment. Also available is a wide variety of plate casters.

Sealed bearings minimize maintenance end hazards of dripping grease

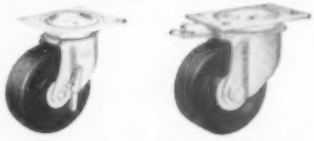
Medium heavy duty (Series "S99") and medium duty (Series "H99") Bassick casters with sealed swivel and wheel bearings reduce caster maintenance to a once-a-year lubrication. They are particularly useful in applications exposed to water or steam that might penetrate unsealed bearings. And being sealed, of course, they do not drip lubrication grease on the floor, an unsightly and hazardous condition.



Shock absorbing feature saves floors, loads, casters

Bassick's "Floating Hub" design, now available in light duty up to heaviest duty casters, absorbs shocks, snubs out vibration.

These unique casters are ideal for handling of liquids, breakable or delicate loads. But they are now finding use, too, in handling heavy loads in power pulled applications over extremely rough floors. Under conditions that kill ordinary casters, Bassick Floating Hub casters keep rolling. And they protect floors, too.



Wheel brakes, swivel locks extend range of equipment you can mobilize on casters

Scaffolds, machine tools, many types of equipment once considered stationary, now roll into position on casters, then stand steady when wheel brakes (left) are applied. Swivel locks (right) let you use equipment either on a straight-line movement job or for general mobility . . . or both.

Distributor can advise

Local industrial distributors who carry Bassick casters can show you the convenient caster refinements described here and often suggest ways you can use them in your handling operation. These men see a lot of plants, a lot of different handling operations. Their know-how, and that of Bassick engineers, is yours for the asking. 9.35

see our catalog in Sweet's

Symbol of SW Excellence

Bassick

A DIVISION OF STEWART-WARNER CORPORATION

THE BASSICK COMPANY, Bridgeport 5, Conn. *In Canada:* Belleville, Ont.

B.F.Goodrich shows you how to choose the industrial tire that's right for your job

Read this page carefully and you may save as much as 50% on industrial tire costs! The right tire—the tire designed for the work you do, the equipment you have and your operating conditions—can make that much difference in your costs. Do you know which is the right tire for you? There are so many variables in industrial tire types, sizes, tread compounds and tread designs, that it takes expert guidance to pick the one that will give longer service at lowest cost. Below we've listed some major materials handling problems, along with the tires to solve them. Use this guide cautiously. Before you buy, consult an expert such as the B.F.Goodrich Tire and Wheel Analysis Man (see overleaf) to make sure you have the right tire for your job!

HOW TO USE THIS WHEEL

1. Descriptions of 8 common materials handling problems are listed in the outer circle. Read them and pick the one that best describes your situation.
2. Turn the wheel so that the window is opposite your job description.
3. In the window you will read about the industrial tire recommended for your job. This recommendation is unbiased because B.F.Goodrich makes a complete line of industrial tires.

OILY FLOORS
Equipment regularly runs over floors on which slick grease, oil or other petroleum products have been spilled.
FRAGILE LOADS
Easily-broken materials must be moved — often over rough hauling surfaces. Traction required.
FACTORY YARD
Rough hauling surfaces and abrasive scrap are the tire-killers here. Heavy loads, too.
A TURN OF THIS WHEEL MAY SAVE YOU AS MUCH AS 50% ON INDUSTRIAL TIRE COSTS!
Special oil-proof tread compound gives maximum economy and efficiency.
B.F.Goodrich
Smileage!
INDOOR & OUTDOOR HAULING
Equipment operates between buildings as well as within buildings, perhaps on docks or loading platforms.
GIANT LOADS
This problem is most often found in industrial plants where enormous trucks move great weight short distances.
UP AND DOWN RAMPS
Extra traction is required for this work, which might be at a loading area or within a plant or warehouse.
DEBRIS-STREWN FLOORS
Tires are subject to cutting and chipping from scrap material such as is found in a manufacturing plant.
SMALL, LIGHT LOADS
Materials must be moved only short distances under favorable conditions.

© The B.F.Goodrich Company

B.F.Goodrich shows you how to choose the industrial tire that's right for your job

Read this page carefully and you may save as much as 50% on industrial tire costs! The right tire—the tire designed for the work you do, the equipment you have and your operating conditions—can make that much difference in your costs. Do you know which is the right tire for you? There are so many variables in industrial tire types, sizes, tread compounds and tread designs, that it takes expert guidance to pick the one that will give longer service at lowest cost. Below we've listed some major materials handling problems, along with the tires to solve them. Use this guide cautiously. Before you buy, consult an expert such as the B.F.Goodrich Tire and Wheel Analysis Man (see overleaf) to make sure you have the right tire for your job!

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OILY FLOORS
Equipment regularly runs over floors on which slick grease, oil or other petroleum products have been spilled.

Special oil-proof tread compound gives maximum economy and efficiency.

FRAGILE LOADS
Easily-broken materials must be moved — often over rough hauling surfaces. Traction required.

Pneumatic tire with traction tread ideal. Other types not as efficient.

FACTORY YARD
Rough hauling surfaces and abrasive scrap are the tire-killers here. Heavy loads, too.

All-Purpose pneumatic first choice. Other types possible.

INDOOR & OUTDOOR HAULING
Equipment operates between buildings as well as within buildings, perhaps on docks or loading platforms.

Choose traction tread for top efficiency. Pneumatic tires best.

GIANT LOADS
This problem is most often found in industrial plants where enormous trucks move great weight short distances.

Pressed-On tire with grooved tread best. Others less economical.

Choose a traction tread—in either pneumatic or solid.

Solid tires best. Several tread designs available.

Best for economy is Pressed-On solid tire with smooth tread.

UP AND DOWN RAMPS
Extra traction is required for this work, which might be at a loading area or within a plant or warehouse.

DEBRIS-STREWN FLOORS
Tires are subject to cutting and chipping from scrap material such as is found in a manufacturing plant.

SMALL, LIGHT LOADS
Materials must be moved only short distances under favorable conditions.

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B.F.Goodrich Tire Company
A Division of The B.F.Goodrich Company
Department TW-739, Akron 18, Ohio

☐ Please send me FREE copy of B.F.Goodrich Industrial Tire booklet

☐ I would like further information on your FREE TW Analysis

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Mail this coupon TODAY!

for FREE copy of B.F.Goodrich Industrial Tire booklet and further information on . . .

FREE B.F.Goodrich TW TIRE AND WHEEL Analysis Plan

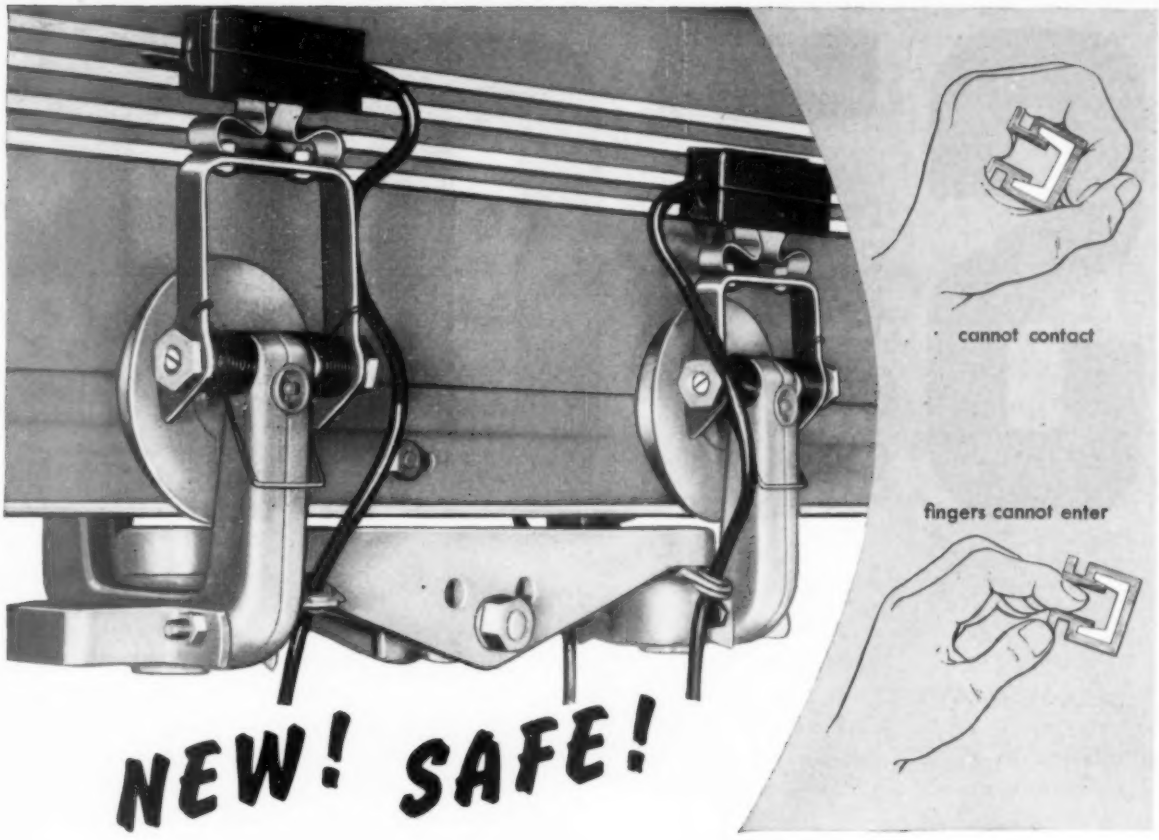
B.F.Goodrich saves you money on industrial tires and maintenance

It takes a tire expert to know which industrial tire will give longest service at lowest cost on a given materials handling job. Such an expert is your B.F.Goodrich Tire and Wheel Analysis Man. His services are FREE. Just mail the coupon above, and without cost or obligation the TW Analysis Man will study your equipment, hauling surfaces, loads and any special problems you have. He'll recommend the *right* tires for you to use, recommendations that can save you up to 50% on tire costs and 20% on maintenance costs. Mail the coupon today! A special consulting service is available to manufacturers of materials handling equipment. *B.F.Goodrich Tire Co., A Division of The B.F.Goodrich Company, Akron 18, Ohio.*

Specify B.F.Goodrich tires when ordering new equipment

Enter the B.F.Goodrich Truck Tire Mileage Contest. See your nearby dealer for entry blanks.

B.F.Goodrich *industrial tires*



NEW! SAFE!

AMERICAN MONORAIL

KANT SHOCK

SHIELDED ELECTRIFICATION

For Monorail Track and Crane Systems

By covering its standard bus bar electrification with a specially designed polyvinyl chloride extrusion, American MonoRail now furnishes completely safe electrified systems.

This KANT-SHOCK shielding absolutely prevents accidental contact with live bus bars. It is impossible for an adult's finger to enter the shield.

A new type sliding shoe collector provides a floating contact throughout a monorail system regardless of any misalignment due to bent bars or at switch and inter-lock connections.

KANT-SHOCK Electrification positively eliminates all the hazards of open bar conductors — prevents costly accidents — protects employees — reduces insurance rates.

Write for KANT-SHOCK Bulletin KS-1

ENGINEERED MATERIALS HANDLING

13114 ATHENS AVENUE
CLEVELAND 7, OHIO

OVERHEAD HANDLING EQUIPMENT

AMERICAN MONORAIL

MEMBER OF MATERIAL HANDLING INSTITUTE AND MONORAIL MANUFACTURERS ASSOCIATION

STOP.

right here if you have a hand in plant paint purchases!

The handwriting's on the wall, in more ways than one, when it comes to modern plant maintenance. Today, more than ever, it is important that you find new ways to keep your material and labor costs in line! Which is why we're taking off the gloves to bring you some two-fisted facts on painting costs.

When you buy paint you pay twice . . . once when you purchase paint to do a job, *again* when you pay for labor to apply it. For this reason, it makes sense to specify a paint which not only looks good on your purchase order, but one that rings in with a new cost-cutting figure on maintenance crew time cards. And this is exactly what you buy when you specify Barreled Sunlight Engineered Paints. Each one is *engineered* to go on quick and easy to save man-hours . . . engineered to withstand the roughest, toughest conditions . . . engineered to hold its color, finish and "fresh-paint" look longer than any other paint you can buy.

We'd like an opportunity to prove this to you—in your own plant—without obligation. The famed Barreled Sunlight "On-the-Wall" Test is designed to demonstrate the kind of money-saving performance you *should* be getting for your paint dollars. It costs you nothing and *can* save you plenty. Fill out the coupon now.

Barreled Sunlight®

ENGINEERED Paints

FOR A BETTER LOOKING, LONGER LASTING PAINT JOB AT LOWER COST

For more facts Circle 463 on Reader Service Card

BARRELED SUNLIGHT PAINT COMPANY
2-C Dudley Street, Providence 1, Rhode Island

I have a hand in plant paint purchases . . . tell me more about Barreled Sunlight Engineered Paints!

☐ Please have your representative call me to arrange a free "On-the-Wall" Test.

☐ Please send me your new "Quick Reference Guide" to Barreled Sunlight Paints.

Name.....

Company.....

Street.....

City.....*State*.....

President Harvey Gaylord, right, discusses with Roger M. Cox the Scott Wiper Survey that led to impressive savings at Bell Helicopter Corporation. (Without obligation, Scott will provide a survey of your plant to see whether your wiper costs can be reduced.)

Low unit cost of Scott Wipers provides economical engine clean-up for after-flight inspection. With a box of Scott Wipers beside the work station, employees save time formerly lost in tracking down fresh cloth wipers.

High wet-strength Scott Wipers wipe away oil and chips at gear grinders and other machines without tearing. Since they're disposed of as used, there's little chance of imbedded chips scratching the worker.

At identification-number stamping operation, absorbent Scott Wipers quickly remove smudges from work piece and operator's hands. Scott Wipers leave no lint.

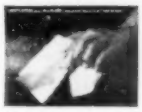
Because they're white, Scott Wipers make it easy to detect imperfections when inspecting precision work. Scott Wipers eliminate the laundering expense of rags.

For more facts Circle 464 on Reader Service Card

Mr. Roger M. Cox, Supervisor of Buildings and Grounds,
Bell Helicopter Corporation, Fort Worth, Texas,
buys Scott Wipers because:

"By changing from baled rags to Scott Wipers, Bell Helicopter is saving $10,000 a year"

☐ I'd like to see your new 15-minute John Cameron Swayze documentary film, "Paper in Industry." (Shows how leading firms across the country use modern wiping methods to lower operating costs, speed output and improve employee safety.)



☐ Send 24-page illustrated booklet, "Industrial Wiping—an area where costs can be cut!" (Describes the modern methods of determining wiping costs and controlling them through value analysis and programming—shows how to save money now being lost with haphazard wiping methods.)

☐ I'm interested in complete case histories of wiping programs in the following industries:

- ☐ Aviation
- ☐ Chemical
- ☐ Electrical
- ☐ Food
- ☐ Machinery
- ☐ Metals
- ☐ Petroleum
- ☐ Transportation

☐ Send the Scott Wiper Cost Survey—a simple form that analyzes the exact cost of my present wiping program.

☐ I'd like to arrange a 20-minute in-plant demonstration that would bring my foremen up to date on the latest techniques for wiping efficiency.

SCOTT PAPER

SCOTT PAPER COMPANY
Department F-93, Front and Market Streets, Chester, Pennsylvania

Please see that I receive—without cost or obligation—the wiper information checked above.

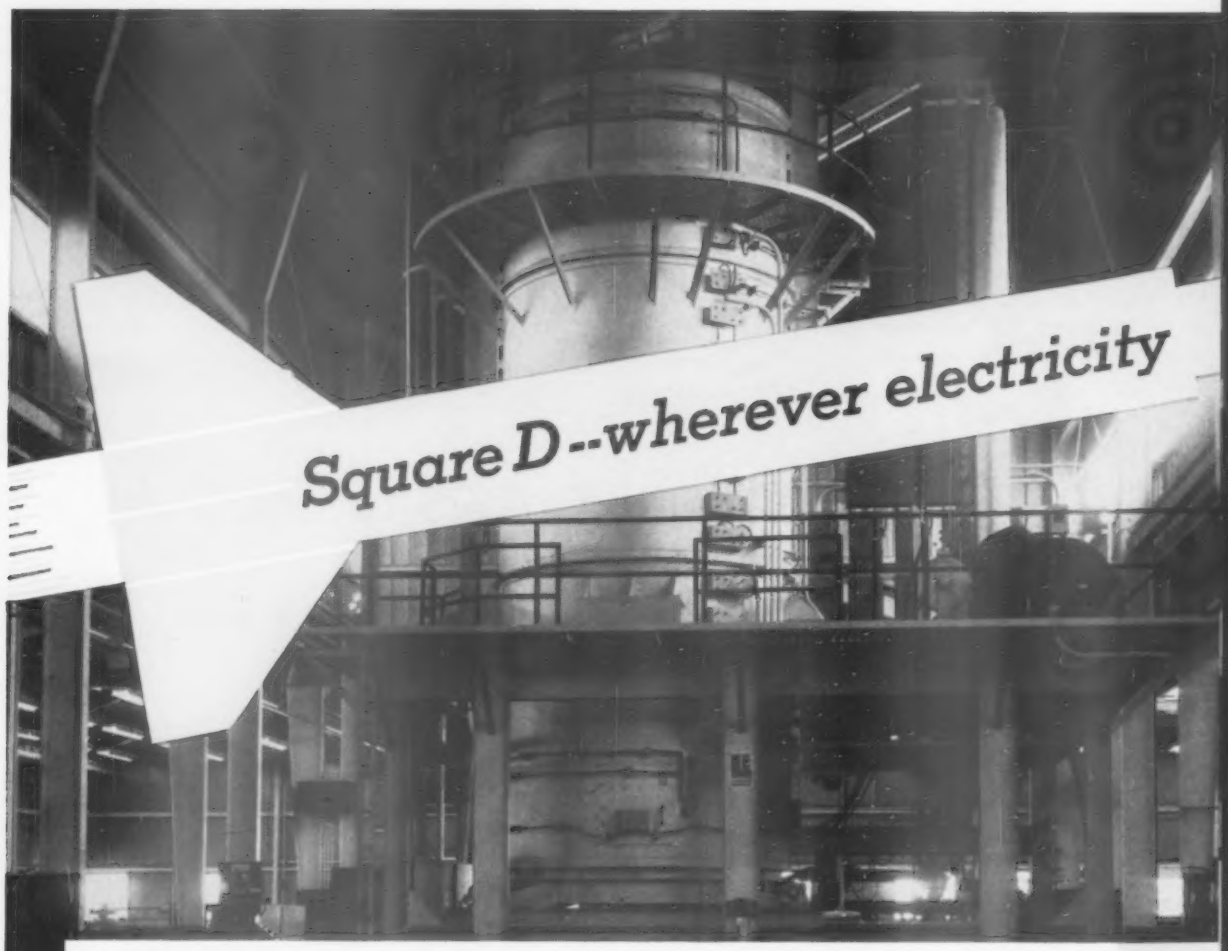
Name_____

Title_____

Company_____

Street_____

City_____ Zone____ State_____



Largest Hardening Furnace of Its Kind in the World!

This Gantry-type Lindberg furnace, built for the Goodyear Aircraft Corporation of Akron, is the world's largest vertical, controlled-atmosphere, drop-bottom hardening furnace. *It towers 24 feet high and is capable of heat-treating rocket cases more than five feet in diameter, 20 feet long and weighing as much as 5,000 pounds!* The furnace pit is 18 feet wide, 53 feet long and 25 feet deep. The furnace spans the entire width of the pit and can be moved, under power, from one end to the other, permitting loading or unloading at any of the pit stations.

Square D control puts this giant through its precise paces!

FIELD ENGINEERING SERVICE is available through more than one hundred Square D offices, backed by an international network of over 1000 authorized electrical distributors and 19 plants in the United States, Canada, Mexico and Great Britain.

Executive Offices • 6060 Rivard Street, Detroit 11, Michigan

EC&M HEAVY INDUSTRY ELECTRICAL EQUIPMENT...NOW A PART OF THE SQUARE D LINE

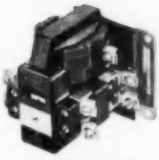
SQUARE D COMPANY ★ ★

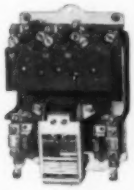
is distributed and controlled

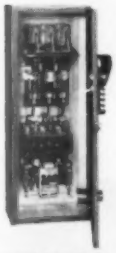
HERE ARE THE KINDS OF SQUARE D PRODUCTS WHICH LINDBERG USES TO CONTROL ITS FURNACES

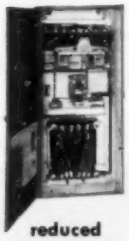
circuit breakers

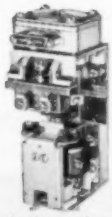
contactors

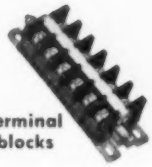

machine tool relays


starters


combination starters


reduced voltage starters


timing relays


terminal blocks

limit switches

typical panel which affords remote pushbutton control of furnace door, winch and longitudinal travel of furnace

pushbuttons

safety switches

A *Complete* LINE OF ELECTRICAL DISTRIBUTION AND CONTROL EQUIPMENT

ADJUSTABLE SPEED DRIVES
BUSWAYS & WIREWAYS
CIRCUIT BREAKERS
CONTROL CENTERS
CRANE & HOIST CONTROL
DISTRIBUTION SWITCHBOARDS
ELECTRIC TRUCK CONTROL
HIGH VOLTAGE CONTROL
LAUNDRY CONTROL
LIFTING MAGNETS
LIGHTING AND POWER PANELBOARDS
LIGHTING CONTROL—LOW VOLTAGE
LIMIT AND FOOT SWITCHES
MACHINE TOOL CONTROL
MAGNETIC BRAKES
METER MOUNTINGS
MOTOR STARTERS
PRESS CONTROL
PRESSURE, FLOAT, & VACUUM SWITCHES
PUSHBUTTONS
RELAYS AND CONTACTORS
RESISTORS
SAFETY SWITCHES
SERVICE ENTRANCE EQUIPMENT
STAGE DIMMERBOARDS
STEEL MILL CONTROL
SWITCHGEAR & UNIT SUBSTATIONS
SYNCHRONOUS MOTOR CONTROL
TERMINAL BLOCKS
TEXTILE MACHINE CONTROL
TIMERS
VOLTAGE TESTERS
WELDER CONTROL

For more facts Circle 465 on Reader Service Card

motors for

YOURS
from the case of the
A. O. Smith motor man

Vertical Hollow Shaft Motors 1 to 700 hp
Heavy, solid cast iron frames that can't dent or rust through. Also, sealed bearing chamber . . . metered oil flow . . . dual ventilation. Available in weather-protected, TEFC and explosion-proof models.

Jet Pump Motors ⅓ to 3 hp
Exclusive totally-enclosed end-mounted starting switch—sealed from dust and dirt. Controlled ventilation for uniform cooling of windings and rotating parts. Dust-carrying air is directed *away* from bearings for longer life.

New SEALED CAPSULE Fractional Motors ½ to 2 hp
Single-phase fractionals that seal out the biggest single cause of fractional motor failure. The exclusive, adjustable starting switch; the actuator, capacitor, thermostat and terminal board — all totally protected against mechanical damage or contamination . . . by the revolutionary *sealed capsule*. Motors can be mounted in any position. Other features include decibel-conscious application of sealed, prelubricated bearings that brings sleeve-bearing quietness to ball-bearing motors.

Close-Coupled pump and "C" Face Motors ⅓ to 150 hp
Slash installation costs and time. Flange bolts directly to pump casing. Pump impeller mounts directly on shaft. On all close-coupled and "C" face pump motors, extra care is taken on all machine tolerances to assure alignment of pump impellers.

every pump application

domestic
industrial
agricultural

WIDE CHOICE ASSURES PROPER SELECTION

Dependability, rugged construction and design that provides the extra stamina to walk through motor-killing loads are three good reasons why it pays to specify A. O. Smith pump motors — ⅓ to 800 hp.

But more, you get a wide range of HP in every type plus an exceptional range of electrical and mechanical modifications. Result — A. O. Smith pump motors can be matched exactly to the job at hand.

Vertical Solid Shaft Motors ⅓ to 800 hp
Feature the same heavy, trouble-free construction as A. O. Smith Vertical Hollow Shaft Motors . . . excess thrust capacity . . . grease-lubricated shielded bearings for added service life.

Horizontal Integral Motors 1 to 800 hp
Single or polyphase . . . with every variation. Open weather-proof, TEFC or explosion-proof; all voltages, any insulation required. These motors feature a unique lubrication system with bearings that *can't* be overgreased.

For complete details, see your A. O. Smith motor man or write direct.

Through research . . . *a better way*

A.O.Smith
CORPORATION
ELECTRIC MOTORS
Tipp City, Ohio
A. O. Smith International S. A., Milwaukee 1, Wisconsin, U. S. A.

Make profit moves NOW to COMPETE at a PROFIT

The future is great in a growing America.

And, now is the time to get ready to cash in big. Make those profit moves that will pay off in increased efficiency, higher productivity, lower costs, bigger sales, bigger profit.

Why now? Machinery, equipment, tools, materials, and manpower are more readily available—at better costs—than they will be in the foreseeable future. Quality is high. Financing is favorable. It's safe to predict that by acting NOW, you'll get most for your money.

This way, you won't simply be *competitive* when the big rush starts. You'll be COMPETITION . . . the big competition in your line.

Good starting point is your materials handling and storage systems. Convert static storage facilities into active inventory materials movement centers. Save space, save time, save money. Select the units you need now from Republic's complete line of steel boxes, skids, pallets, pallet racks, shelving, lockers, and METAL LUMBER. Republic's Berger Division Materials Handling Engineers and Storage Engineering Specialists will help you in selection and use, or in designing special units to meet your specific requirements.

Make your first profit move NOW.

For more facts Circle Reader Service Card numbers as follows:

PROFITABLE IN-PLANT CONSTRUCTION is fast and economical with Republic METAL LUMBER®. This new slotted construction angle meets all your framing needs. Unique pattern of short slots allows complete flexibility and assures sufficient bolts in bearing to give adequate joint strength.

METAL LUMBER is Bonderized and finished in baked enamel after fabrication. This assures long-time resistance to rust, other damage. Convenient bundles of 10 pieces, 10- and 12-foot lengths, bolts included. Store several bundles for use wherever you need framing material. Then simply plan, cut, and bolt to get the job done the METAL LUMBER way.

IMPROVED HANDLING AND STORING of bar stock, shafting and pipe are profit moves you can make now with Republic's Sectional Bar Racks. Load or unload from either side or either end. Each upright supports more than 25,000 pounds when loaded both sides. Short or long stock is handled with equal ease and convenience. Made in any desired length in multiples of 35- or 70-inch units. Uprights are 96 inches high. Eleven-inch brackets are easily adjusted at six-inch intervals without dismantling to meet changing storage needs. Long life is built in. All surfaces are Bonderized to resist rust, retard corrosion, and provide better paint adhesion. Finish is baked enamel. Mail coupon for full facts.

IMMEDIATE AND LONG-RANGE SAVINGS are being achieved at John Deere with the help of precision-made Republic Steel "Bolt Down" Pallets. Four combine engines are bolted to each pallet at Deere's Dubuque, Iowa plant, then trucked to the Harvester Works at East Moline, Illinois. Engine-loaded pallets are picked up by fork trucks and moved quickly and easily to the production line or to temporary storage. Republic Steel Pallets eliminate the need for truck dunnage for shoring up each individual engine. This feature alone results in a time saving of 80% in loading operations and 86% in unloading. Tough, strong steel pallets were selected by Deere, because they would require minimum maintenance and would be usable over many years. Handling problem? Contact Republic for a profitable solution.

REPUBLIC STEEL

World's Widest Range of Standard Steels and Steel Products

Contact Republic.

REPUBLIC STEEL CORPORATION
DEPT. FA -6960
1441 REPUBLIC BUILDING • CLEVELAND 1, OHIO

☐ Have a Storage-Materials Handling Engineer call.
Send more information on:
☐ METAL LUMBER ☐ Sectional Bar Racks
☐ Materials Handling Equipment

Name_____ Title_____

Company_____

Address_____

City_____ Zone____ State_____

468 Metal Lumber, 469 Sectional Bar Racks, 470 Materials Handling Equipment

Architect: GRAHAM, ANDERSON, PROBST & WHITE, Chicago, Illinois
Electrical Contractor: HYRE ELECTRIC CO., Chicago, Illinois

Electrical Protection goes MODERN *with BUSS fuses! . . . in the MORTON SALT BUILDING Chicago, Ill.*

The beautiful, new Morton Salt Building is located at 110 North Wacker Drive in Chicago — just outside the Loop.

The safest and most dependable electrical protection was needed because the engineers estimated the available fault current might easily reach a value of 75,000 amperes.

For this reason, the main switchgear, consisting of 1-4000 ampere, 1-2000 ampere and 1-1200 ampere pressure switch, is completely equipped with BUSS Hi-Cap fuses.

To make available the same safe, dependable and trouble-free protection, all distribution panels are equipped with FUSETRON dual-element fuses.

THERE IS A BUSS OR FUSETRON FUSE FOR EVERY ELECTRICAL NEED

ONLY FUSES OFFER THE SAFETY AND DEPENDABILITY REQUIRED FOR TODAY'S CIRCUITS

Because of the ever-increasing transformer and network capacities, Power Companies now consider quite possible fault currents of 75,000 to 200,000 ampere.

So too, the requirements for protective devices have been changed to assure safe interruption of these higher fault currents.

Fuses, — because of their high interrupting capacity and dependability — prove superior in meeting modern protection requirements.

With Fuses, Safe Protection Remains Safe

Dust, fumes, corrosion or age cannot increase a fuse's capacity or lengthen its blowing time. The operation of a fuse is not dependent on latches, triggers or other devices that are subject to the strains and jars of mechanical action — both in opening and closing.

A fuse cannot stick or fail to operate when electrical trouble occurs. 1 year, 5 years or 20 years from now, a fuse will provide the same, high degree of protection as on the day it was installed.

Morton Salt Building: Mains and Feeders protected by BUSS Hi-Cap and FUSETRON Fuses

On installations of 0 to 600 amperes . . .

By Installing FUSETRON dual-element FUSES — YOU GET 10 POINT PROTECTION

With rare exceptions, other types of protective devices protect only against short-circuits —

BUT, FUSETRON dual-element fuses give you safe, trouble-free 10 point protection.

For the FUSETRON fuse story ask for Bulletin FIS.

For Loads above 600 amperes . . .

BUSS Hi-Cap Fuses offer Safest, Most Modern Protection

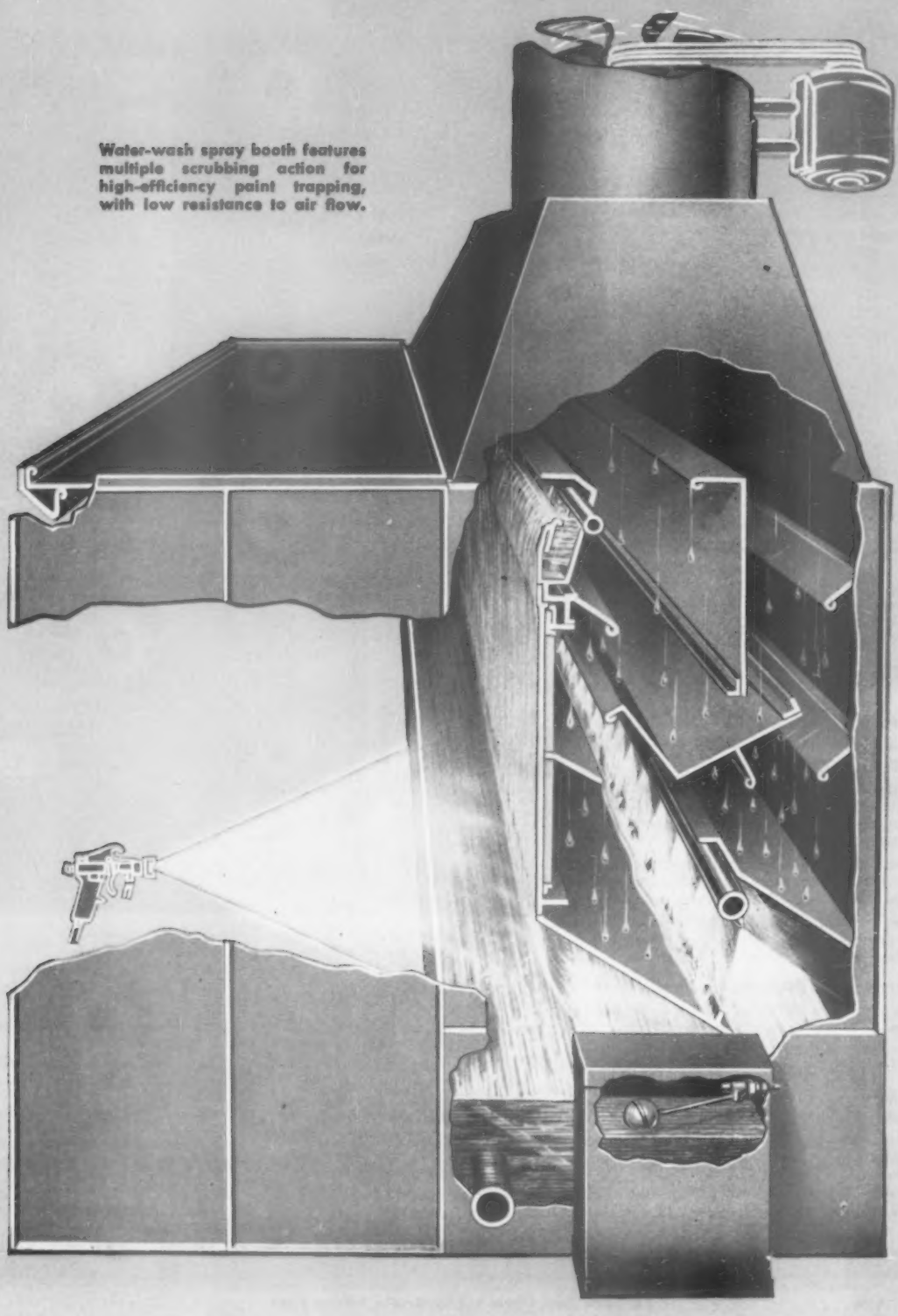
They have an interrupting capacity sufficient to handle any fault current regardless of system growth — and by coordinating them with FUSETRON fuses on feeder and branch circuits, outages caused by fault currents can be limited to circuit of origin.

For the BUSS Hi-Cap fuse story ask for Bulletin HCS.

359

BUSSMANN MFG. DIV. McGRAW-EDISON CO. ST. LOUIS 7, MO.

Why DeVilbiss offers



Water-wash spray booth features multiple scrubbing action for high-efficiency paint trapping, with low resistance to air flow.

you the best value in spray booths today

- **Standardized parts and modular, prefabricated steel panels provide more rigid, more versatile, more durable booths at lower cost!**
- **Specific models, standard or custom-designed, for every type of spraying operation —automatic, electrostatic, or manual!**
- **Each model and type is job-rated, job-proved for guaranteed performance!**
- **Manufactured to the standards of the National Board of Fire Underwriters for spray booths as recommended by the National Fire Protection Association!**

When you choose a DeVilbiss spray booth, you get the unit best suited to your purposes, *at great savings.* That's because DeVilbiss offers economy of operation, efficiency of performance, and ease of installation made possible by scientific adaptation of modular design principles.

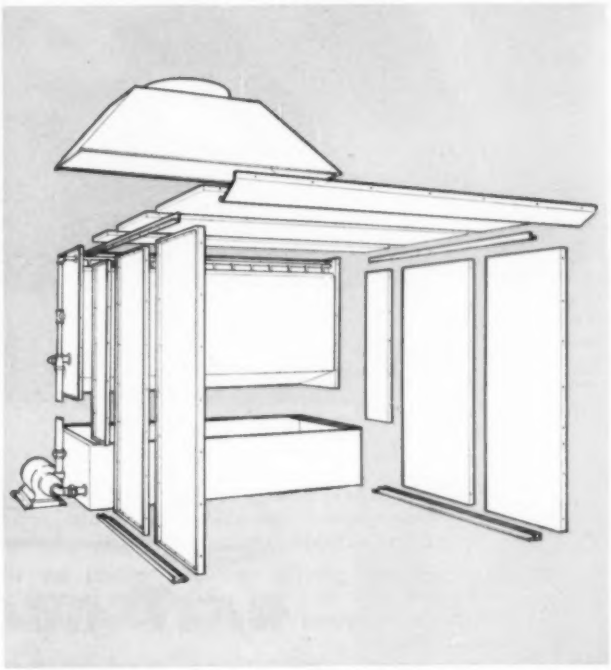
Bolt-together construction saves erection time; offers flexibility for revamping or moving booths as operations and plant layouts change. Design and construction features provide excellent paint-trapping efficiency; stay cleaner longer; save maintenance time and expense.

So contact your nearest DeVilbiss branch office for complete details on any of the more than 500 standardized spray booths . . . or write for a copy of Spray Booth Catalog I-7000.

FOR BETTER SERVICE, BUY
DEVILBISS

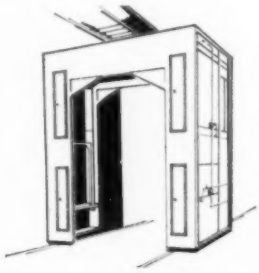
THE DEVILBISS COMPANY
TOLEDO 1, OHIO
Barrie, Ontario • London, England • São Paulo, Brazil
Branch Offices in Principal Cities

DUST COLLECTORS • INDUSTRIAL POWER WASHERS • FLOW & DIP COATERS
OVENS • SPRAY BOOTHS • AIR COMPRESSORS
SPRAY EQUIPMENT • HOSE & CONNECTIONS • MIST COOLANT UNITS

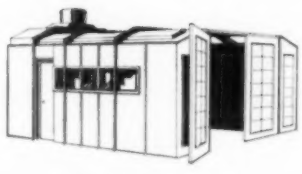


Bolt-together panels of 18-gauge steel, rolled edges, mitered and welded corners provide built-in reinforcement for DeVilbiss Spray Booths. No additional supports or guy wires needed.

Leg-type Spray Booth



Traveling Spray Booth



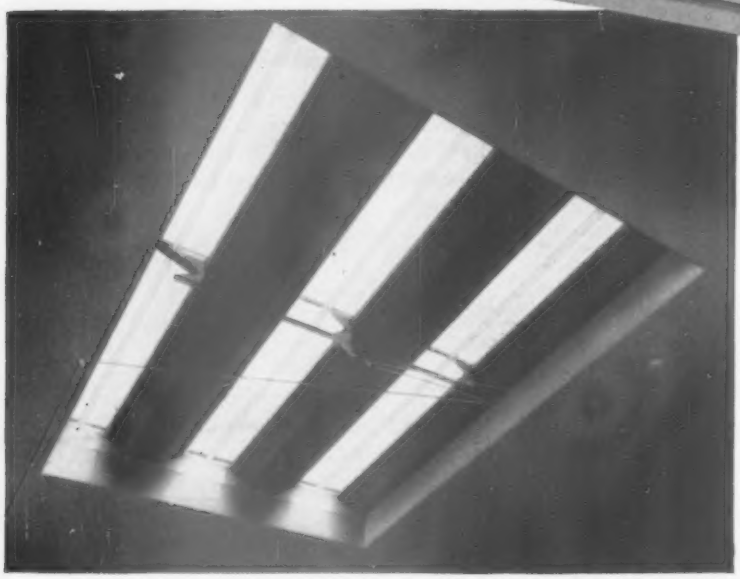
Enclosed Booth with dust filters

Down-Draft Spray Booth

For more facts Circle 472 on Reader Service Card

It's a ventilator . . .

It's a skylight . . .



Patent No. 2,784,660

NEW!

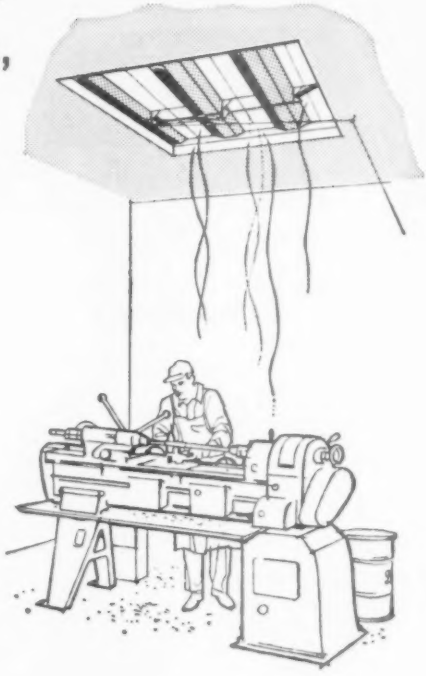
Lite-'n-Aire by Swartwout

One unit, one installation, one cost!

- Strong, translucent Fiberglas* dampers and gutters transmit soft, diffused light . . . no glare or hot spots . . . up to 12,380 candlepower with dampers closed, 16,450 with dampers open.
- High capacity gravity ventilator moves air silently and efficiently. Low 21" roof silhouette is inconspicuous from the street. 30 square feet of free opening provided by each standard unit.
- Extra safety — fusible link mechanism opens dampers automatically when temperature exceeds 212° F. to vent out fumes, smoke, flames. Light transmission prevents power failures from completely darkening buildings.
- Unique Lite-'n-Aire provides ventilation, skylighting and fire relief all in a single, economical unit. Two sizes — 7'6" x 10' and 5' x 5' — fit any situation.

These and many other advantages are all available **now** in the new Swartwout Lite-'n-Aire.

Write for free 8-page folder now. Ask for bulletin CAM-3.



The Swartwout Co.
Ventilation Engineering
18509 Euclid Avenue Cleveland 12, Ohio

In Canada: Eastern Steel Products Ltd., 8 Bermondsey Road, Toronto, Ontario

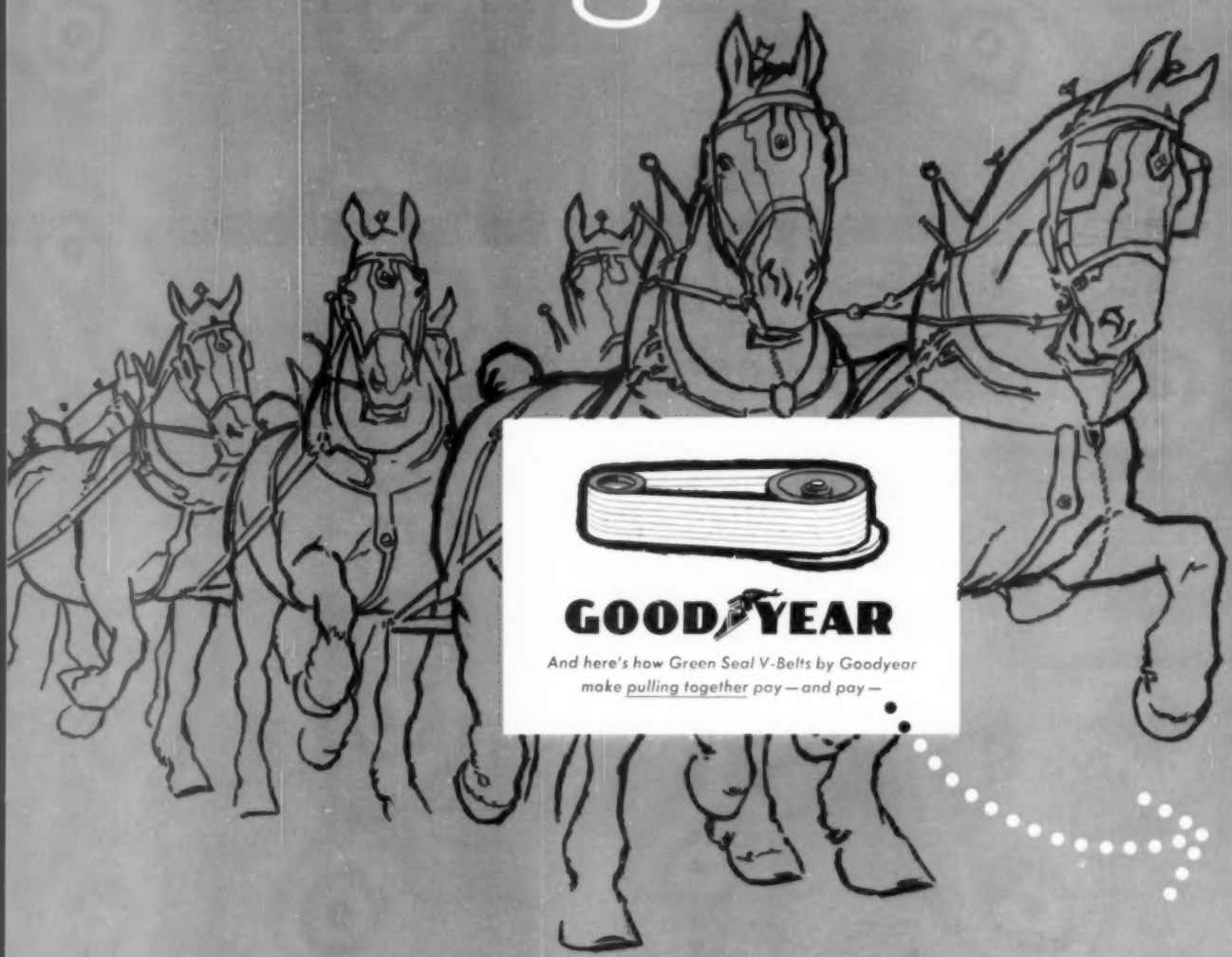
* TM Owens-Corning Fiberglas Corporation

For more facts Circle 473 on Reader Service Card

For more facts Circle 474 on Reader Service Card ➤

IT'S A MATTER OF

pulling together!



GOODYEAR

And here's how Green Seal V-Belts by Goodyear make pulling together pay — and pay —

On every type of drive—in every part of America—Green Seal by Goodyear are and outlast anything

—AT AN OHIO CHEMICAL PLANT

Operation: Pulverizing nickel formate

Drive: Main drive on micro-atomizer—handles 20 h.p. at 5,868 f.p.m.

Service: *Eight matched V-Belts with the Green Seal served for more than 6 months compared with 4-week life for 10 belts of another make.*

—IN A MISSOURI PIPE PLANT

Operation: Making fire clay and sewer pipes

Drive: 125 h.p. ball-mill drive

Service: *Fourteen matched V-Belts with Green Seal construction served 6 years without maintenance of any kind.*

every kind of industry—in matched V-belts with the pulling together to outperform else belt-users can buy—

—ON A TEXAS OIL RIG

Operation: Drilling oil wells

Drive: Main drive on mud pump

Service: *20 V-Belts with the Green Seal pulled together to drill 202,790 feet of hole—more than 25% better than the average belt-life in this service.*

—AT A SOUTH CAROLINA FABRIC MILL

Operation: "Soaping" screen-printed fabrics

Drive: 50 h.p. "soaping" range drive with belt speed of 1,413 f.p.m.

Service: *Ten matched V-Belts with Green Seal construction served 8 years with virtually no time out.*

Here's why

V-BELTS

with the

Green ✿ Seal

always pull together

The secret's their unequalled dimensional stability. And it's built into each belt via special tension members of steel cable or exclusive, synthetic Triple-Tempered (3-T) Cord. Then every set is precision-measured – several times over – to make sure they are perfect teammates.

That means matched sets really match. Every belt does its part of the job. There are no "loafers" to put extra strain on the other belts. No belt ever overworks and causes a premature failure. It's strictly a matter of *pulling together* – whether your drive calls for two or fifty belts.

What's more, every V-Belt with the Green Seal is designed to outperform all others. High in modulus, they're low in stretch to minimize take-up. They're friction-balanced – so covers don't stick or grab in the grooves. They're non-dusting, too.

In short, these are the belts that give you maximum, trouble-free hours at minimum cost. You need belts like these to pull together on your drives–large and small.

Just contact your Goodyear Distributor–or fill out the handy coupon below.

Green Seal–T. M. The Goodyear Tire & Rubber Company, Akron, Ohio

DIMENSIONALLY STABLE V-BELTS WITH THE GREEN SEAL BY

GOODYEAR

THE GREATEST NAME IN RUBBER

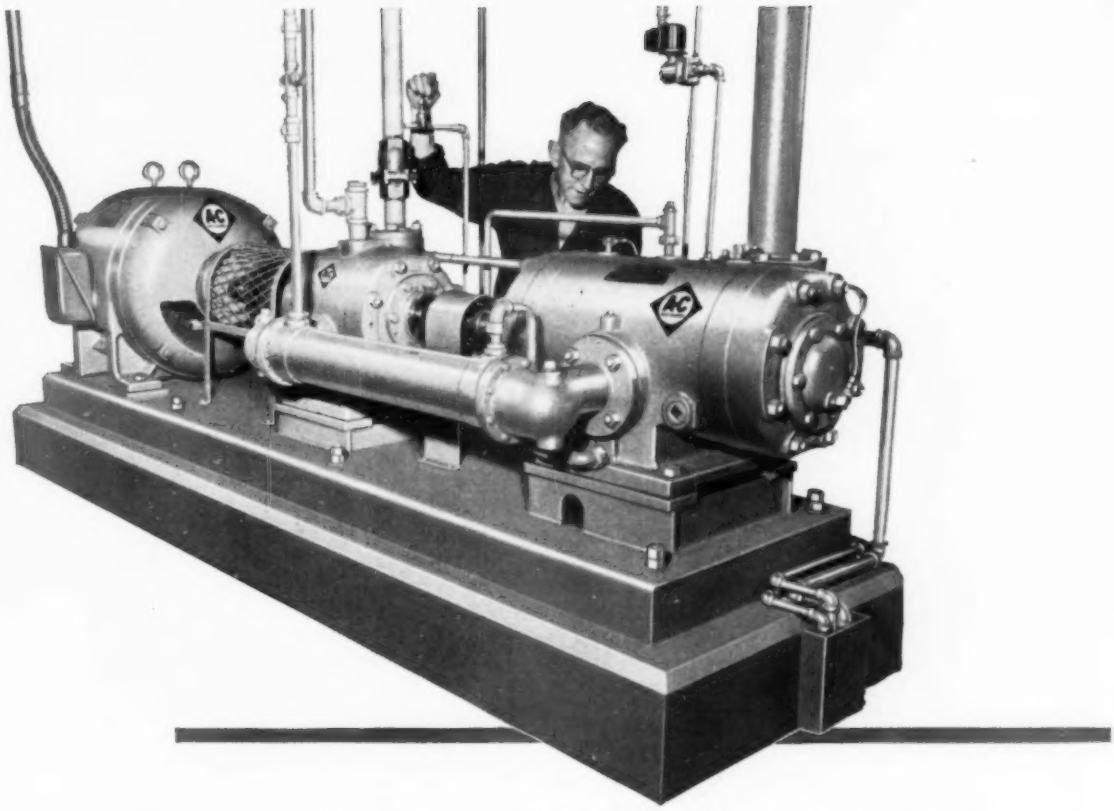
S-51162

THE GOODYEAR TIRE & RUBBER COMPANY, Industrial Products Division, Dept. 794, Akron 16, Ohio
Please send me more information about how V-Belts with the Green Seal solve the major problem in belting multiple V-Belt drives.

Name .....

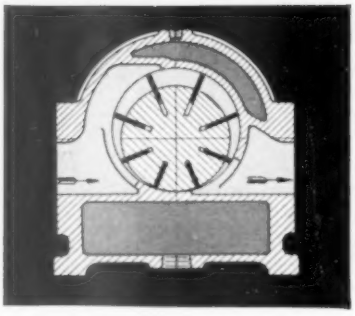
Company .....

Street Address ..... **City** ..... **Zone** ..... **State** .....

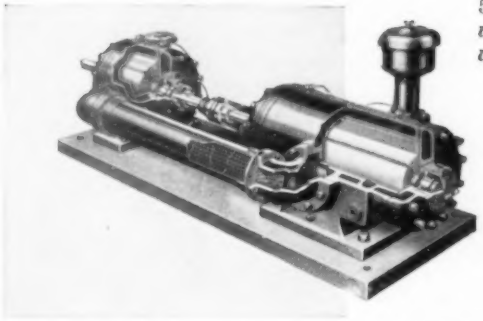


Smooth operation—Prolonged efficiency

with Ro-Flo compressors for plant air supply



Simple operation — centrifugal force holds blades against sidewall to form air chamber.



Rotary operation is smooth, vibrationless. Compare this to the pounding and shock inherent in reciprocating compressors.

That's why *Ro-Flo* compressors eliminate the cost of heavy foundations. A slab is enough. Smaller units are bolted to the floor. And "like-new" efficiency is maintained for years — because rotor blades compensate for wear automatically.

No pistons, valves or connecting rods to cause trouble. Only two wearing parts in the *Ro-Flo* compressor. All this means far less maintenance.

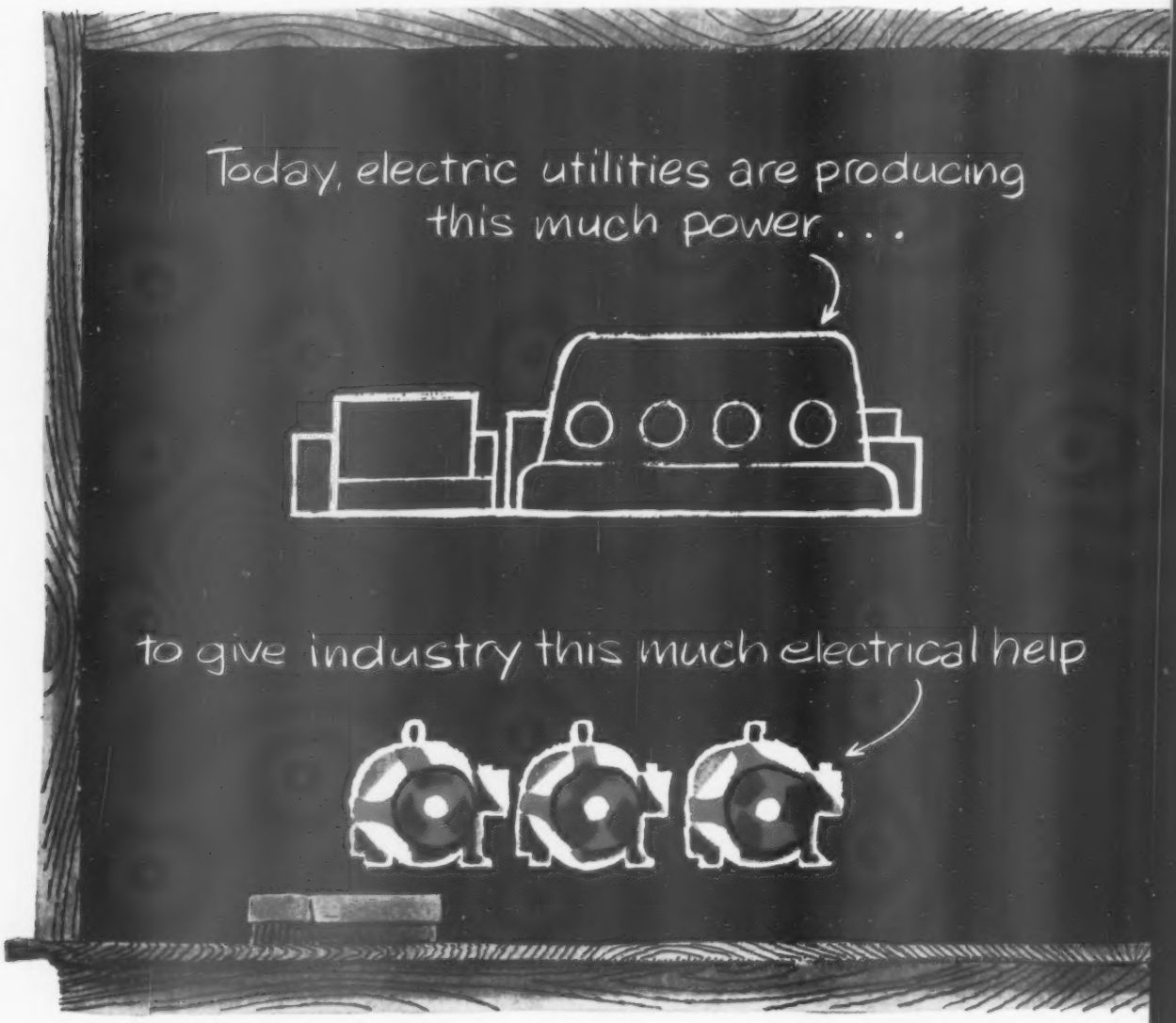
Two-stage units range from 250 to 1800 cfm, from 60 to 125 lb gauge. Single-stage units from 40 to 3000 cfm, up to 50 lb gauge. *Ask your A-C man for descriptive literature, or write Allis-Chalmers, Industrial Equipment Division, Milwaukee 1, Wisconsin.*

Ro-Flo is an Allis-Chalmers trademark.

ALLIS-CHALMERS A-C

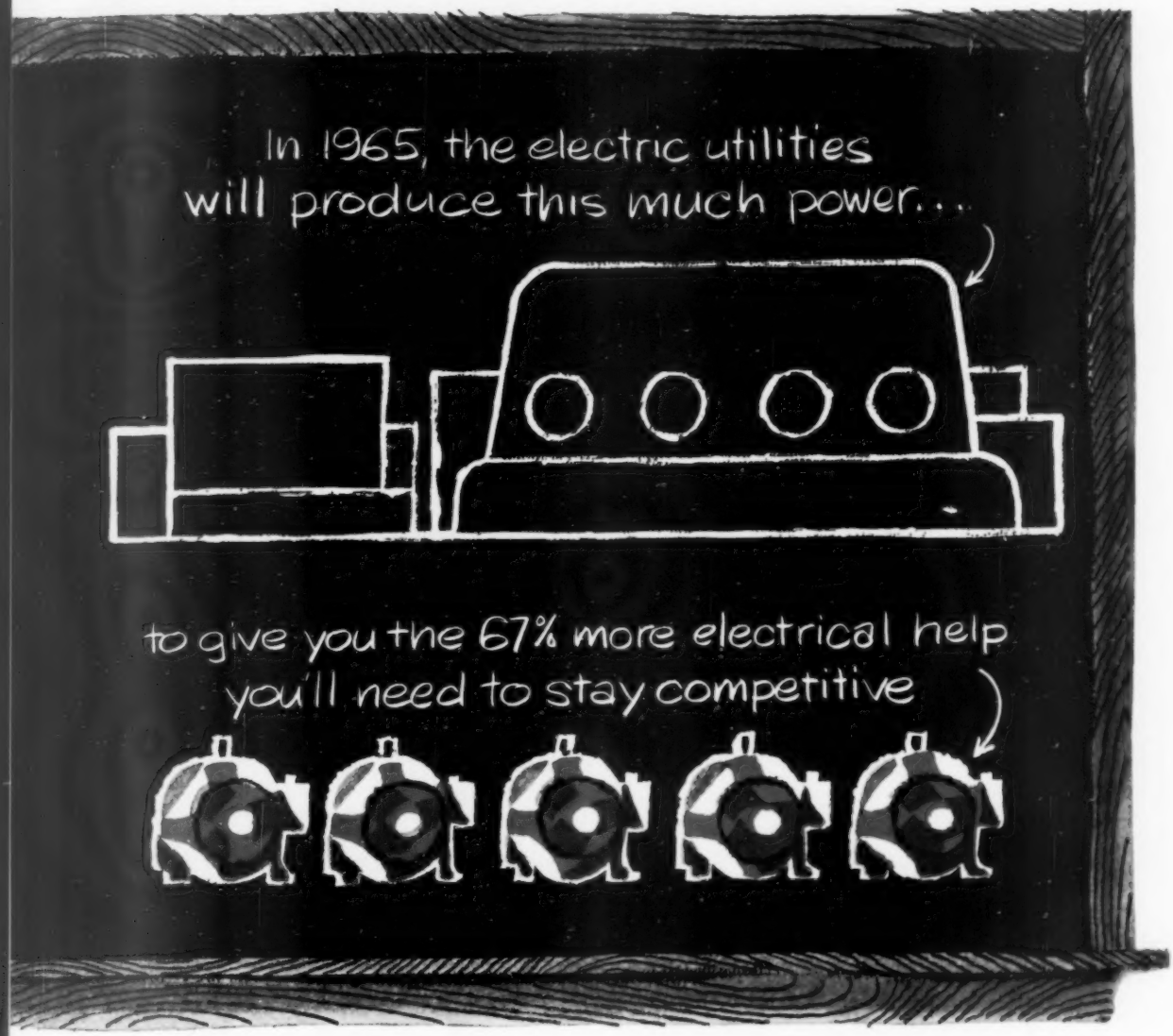
A-5899

Westinghouse and the electric utilities are



POWER-UP FOR PROFIT

working together for your big markets of the '60s


In 1965, the electric utilities
will produce this much power...
to give you the 67% more electrical help
you'll need to stay competitive

ELECTRICALLY

The problem: how to produce the 40% more goods that will be needed in 1965 and still earn a satisfactory return on your investment despite ever rising production costs.

The answer: plan now for production lines that will use more low-cost kilowatthours.

It can be done. It is being done. Call your Westinghouse representative or your electric utility power sales engineer. They have useful information on the productive uses of power and can tell you what steps to take now to start a Power-Up program in your plant. J-96128

YOU CAN BE SURE...IF IT'S Westinghouse

WATCH "WESTINGHOUSE LUCILLE BALL-DESI ARNAZ SHOWS" CBS TV MONDAYS

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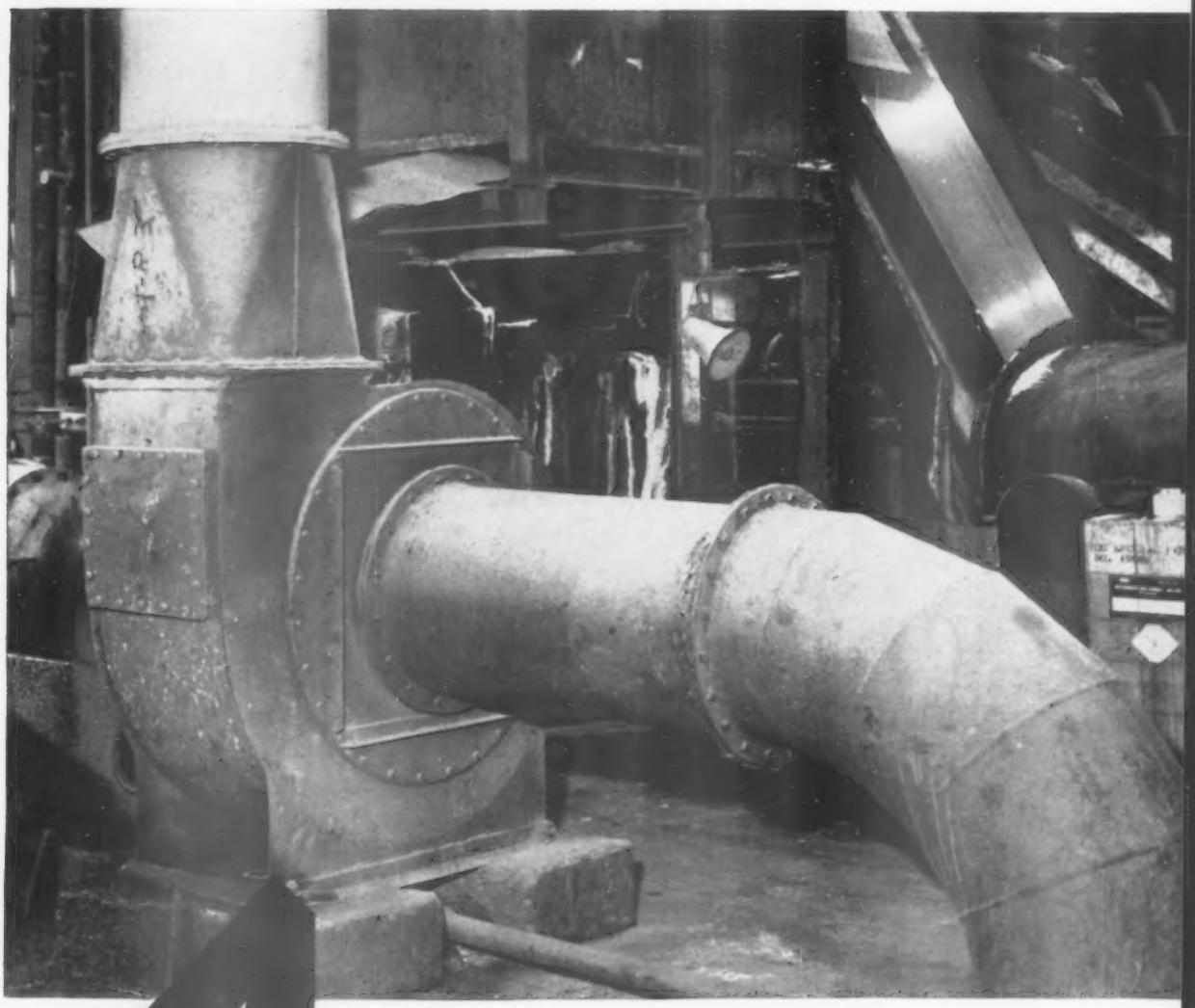


4 "BUFFALO" FANS DESIGNED FOR UNUSUAL PLANT APPLICATIONS

Shown here are four "Buffalo" Fans specifically designed to cover a broad range of unusual industrial air or materials moving applications. If you have a unique problem not covered here, chances are your nearby "Buffalo" Engineering Representative has encountered a similar situation and can provide a practical and economical solution. He has the complete line of "Buffalo" Fans to back him up — plus more than 80 years of "Buffalo" engineering experience covering thousands of installations.

Phone your "Buffalo" Representative, or write us direct for bulletins and full information.

VENTILATING • AIR CLEANING • AIR TEMPERING • INDUCED DRAFT FACTORY

"Buffalo" Rubber-Lined Fans at left:

In handling corrosive acid fumes, users report that "Buffalo" Rubber-Lined Fans stay on the job from three to twelve times as long as ordinary fans. Every part of the fan exposed to acid fumes is covered with soft or hard rubber, as required. Actually welded into the pores of the metal, this rubber coating gives long, trouble-free fan performance under the most severe service. Write for Bulletin FI-110.

"Buffalo" Cast Iron Fans upper right:

These rugged units are built to operate under extreme corrosive conditions in the chemical process industries. Extra-heavy construction is combined with high-efficiency design, resulting in extremely low-turbulence air flow. Air is guided smoothly into the wheels through the sturdy cast iron housing and cast inlet cone. Wheels are non-overloading regardless of system pressure. Write us for full information.

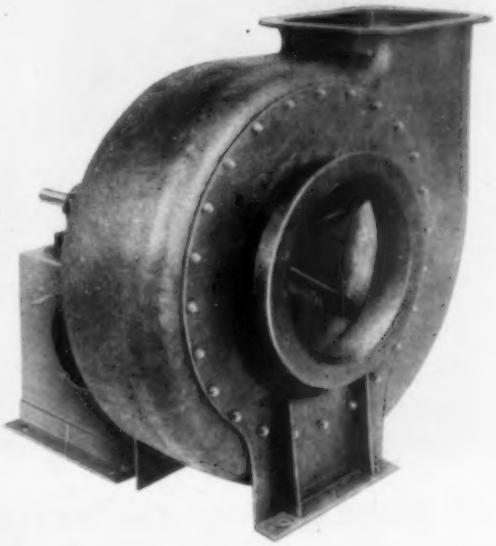
"Buffalo" Fiber Glass Fume Fans right center:

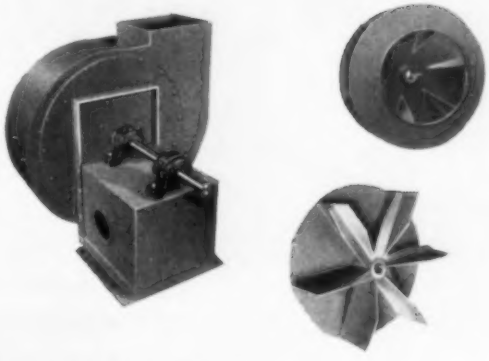
These specially-designed fans provide maximum resistance to acids, salts, gases, organic materials and other corrosive chemicals. The housing is constructed entirely of resin-bonded fiber glass. The wheel and all other metal parts in air stream are encased in thick fiber glass. This means that no metal parts are exposed to attack by corrosive fumes. Peak operating efficiency is maintained by the streamlined "Buffalo" inlet, wheel and outlet. Capacities range up to 34,000 cfm at pressures to 10" static. Write for Bulletin FI-511.

"Buffalo" Materials Moving Fans lower right:

These heavy-duty "Buffalo" Fans are huskily built with specially-designed wheels for highly efficient handling of a wide variety of materials. The standard "MW" wheel is ideal for materials handled by a pneumatic system, such as emery dust, saw dust, chips. The open type "MW" wheel provides smooth surfaces for handling long shavings and all types of stringy material. Capacities available to 21,000 cfm. Write for Bulletin FI-110.

Every "Buffalo" Fan brings you the bonus "Q" Factor — the built-in QUALITY that provides trouble-free satisfaction and long life.





"Buffalo"

BUFFALO FORGE COMPANY

BUFFALO, NEW YORK

Buffalo Pumps Division, Buffalo, N. Y.

Canadian Blower & Forge Co., Ltd., Kitchener, Ont.

EXHAUSTING • FORCED DRAFT • COOLING • HEATING • PRESSURE BLOWING

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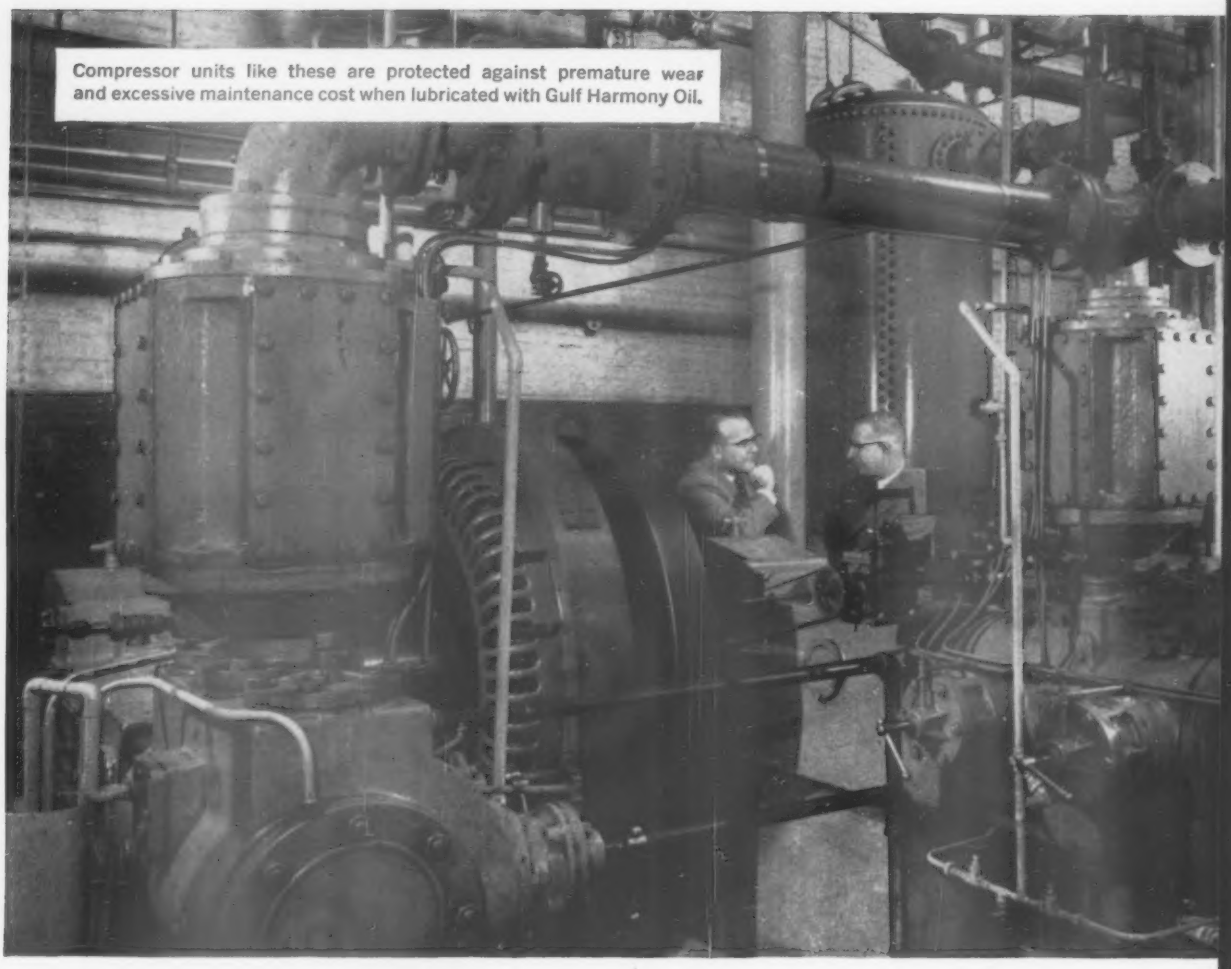


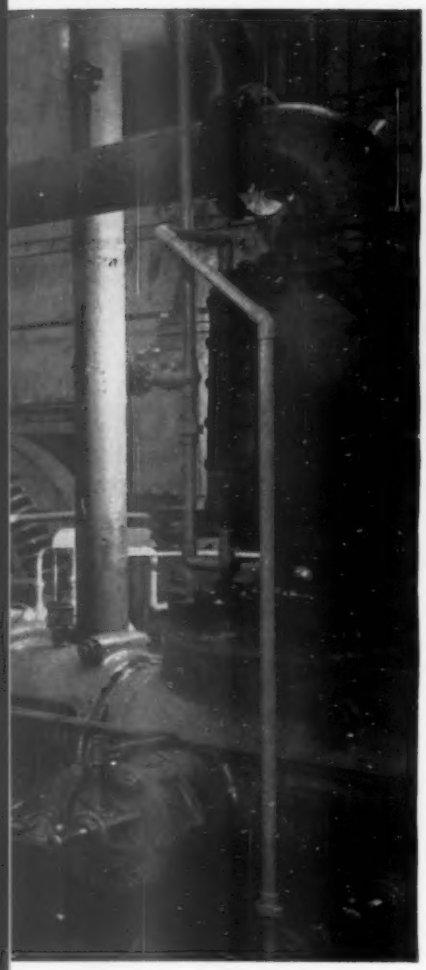
Compressor units like these are protected against premature wear and excessive maintenance cost when lubricated with Gulf Harmony Oil.

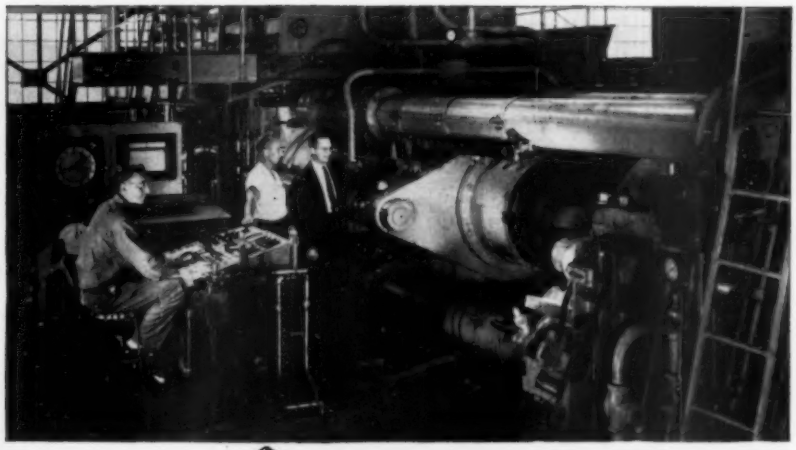
Gulf makes things run better with outstanding multi-purpose

NEW AND IMPROVED

Gulf Harmony, a long-time favorite multi-purpose oil, is now further improved to serve you even better. Here are a few of the improved Harmony's many advantages:

- Higher oxidation resistance assures longer life and freedom from harmful sludge deposits.
- Retains its original viscosity over longer periods of time.
- Maintains its color stability longer.
- Anti-corrosion additive protects against rust.
- Patented anti-foam agent prevents objectionable foaming.
- Performs exceptionally well in bearings exposed to high ambient temperatures and humid atmospheres.





New and improved Gulf Harmony Oil is setting new standards of performance in heavy equipment like this 3000-ton extrusion press.

Hydraulic stamping presses require an oil that has high resistance to oxidation, good rust preventive qualities and anti-foam properties. Gulf Harmony Oil is ideal for this type of service.

industrial lubricating oil . . .

GULF HARMONY

Gulf Harmony is available in the proper grades to meet your every need. It is ideal for hydraulic systems, air compressors, blowers, dryer-roll bearings, machine tools, electric motors, central circulating systems, and a host of other applications.

Your Gulf Sales engineer will gladly show you how new Gulf Harmony can help cut your maintenance costs and simplify your lubricant storage and handling. See how Gulf makes things run better in your operation. Just call your nearest Gulf office, or write for illustrated bulletin.

GULF OIL CORPORATION
Dept. DM, Gulf Building
Pittsburgh 30, Pa.

Yes! Without obligation on my part, send me illustrated bulletin on new Gulf Harmony.

Name_____

Title_____

Company_____

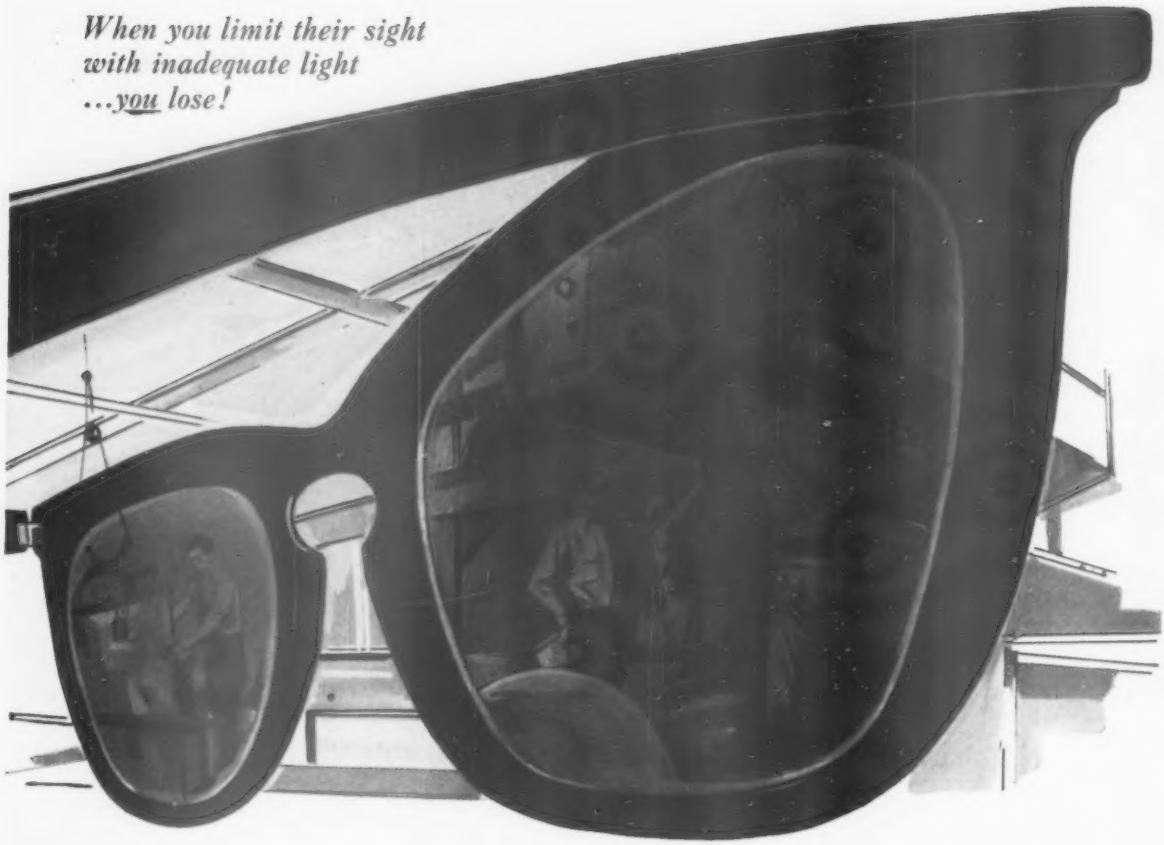
Address_____

City_____ Zone____ State_____

F.M.M-0117

GO-9-0117

When you limit their sight with inadequate light ...you lose!



Dim outlook for output

Inadequate light in your plant slows down production, reduces output, increases accidents. Yet *only 15 per cent* of America's business lighting is adequate by modern standards!

Plants that have modernized their lighting have found that more is needed than just *enough* light! You need high quality, comfortable lighting—Eye-Fi Relighting. Eye-Fi Relighting is *eye-fidelity* lighting, that comes as close as possible to natural daylight. It is scientifically designed to increase profits.

Plant managers say:

Eye-Fi Relighting **ups output.** Modernized lighting increases production, lowers overtime costs.

Eye-Fi Relighting **reduces rejects.** Planned, well-designed lighting improves vision, cuts down costly errors and inaccuracies.

Eye-Fi Relighting **lessens fatigue.** Workers are more alert, more productive; morale is raised.

Eye-Fi Relighting **protects both you and your workers** by minimizing accident hazards.

Eye-Fi Relighting **improves office work, too.** Well-planned lighting helps office personnel to increase efficiency and productivity, reduce errors.

Ask your utility or electrical contractor about Eye-Fi Relighting (in some areas, Certified Eye-Fi Relighting). And be sure your new fixtures carry the Eye-Fi Relighting label.

eye-fi RELIGHTING

Write today for free brochure

A CONSUMER SERVICE ADVERTISEMENT SPONSORED BY THE NATIONAL LIGHTING BUREAU
155 EAST 44 STREET, NEW YORK 17, NEW YORK

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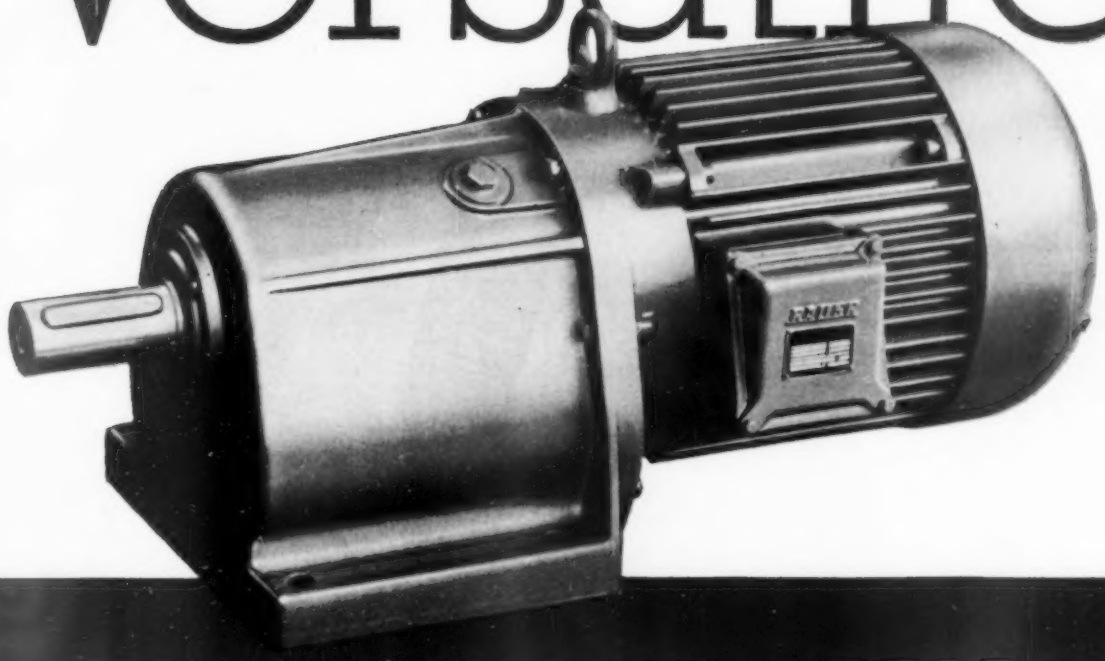
Versatile



BAUER GEAR MOTORS

Save you money right from the start

West Germany's number one gear motor, designed by master craftsmen for the American market, are produced by Bauer with over 30 years of experience in the design of low-speed drives.

Bauer Gear Motors save you money in initial cost . . . and with lifetime low maintenance and service.

These totally enclosed, fan-cooled motors are designed for use in any position, vertical, horizontal, or wall-mounted. Helical gears of high-grade, case-hardened steel assure silent operation. The compactness of Bauer Gear Motors allows installation even in crowded areas. Relubrication after 10,000 working hours only.

1/50 to 30 HP **0.3 to 400 rpm**

Inquire for full details and nearest dealer:

From the same manufacturer

BAUER
DRUM MOTORS
Self-driven head pulleys, enclosed motor and gears in drum. *Write for literature.*

FACTORY REPRESENTATIVE

Georg von Opel Corporation

15 William Street, New York 5, New York

Some protected territories open to distributors.

In Canada: **Alliance Electric Works, Ltd., 145 Bates Rd., Montreal 8, Quebec**

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THIS IS

THE IMAGE OF CF&I ...MAKER OF STEEL

He's a giant steelman. He makes good steel and steel products for the diversified needs of today's economy. He anticipates tomorrow's requirements. He is constantly improving products through research and new manufacturing techniques.

His steel mills extend across the country. In them, he guards every step of manufacturing by rigid quality controls. And in his national network of offices and warehouses, he not only *sells* steel products, but he *serves* their users in every possible way.

He is the dynamic image of CF&I . . . the symbol of dependable steel products. Look for him when you buy.

Plants at:
Pueblo, Colorado • Oakland and South San Francisco, California
Buffalo, New York • Claymont, Delaware • Palmer, Massachusetts
Birdsboro, Pennsylvania • Roebling, New Jersey • Trenton, New Jersey
40 Warehouses and 60 Sales offices located coast to coast

THE COLORADO FUEL AND IRON CORPORATION
DENVER • OAKLAND • NEW YORK

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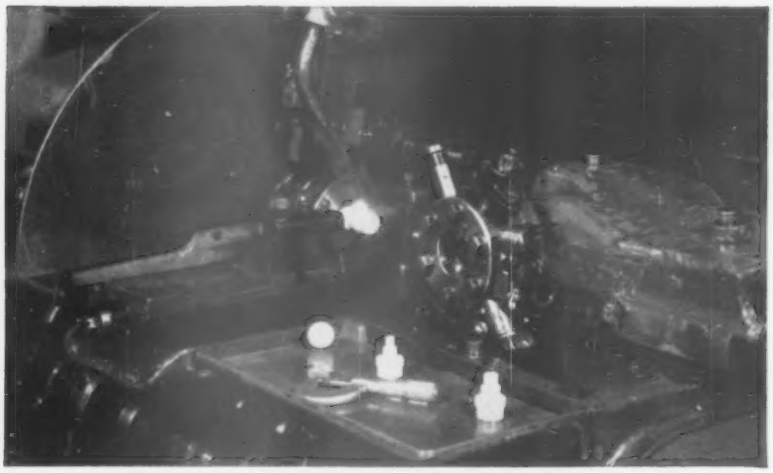
Lubrication



SPECIALLY TRAINED OPERATORS now machine "Teflon" to tolerances of .001" with Texaco Cleartex BX.

ANSWER TO "TEFLON" MACHINING PROBLEM FOUND BY THROWING OUT STANDARD CUTTING TECHNIQUES

DuPont's new thermoplastic, "Teflon" (or, more precisely, Polytetrafluoroethylene resin) has a combination of properties which makes it uniquely advantageous in a number of applications.

They also make it uniquely difficult to machine.

Unlike other thermoplastics, "Teflon" does not flow well in its melted state. This, plus the fact that the molding process requires extremely high temperatures, makes molding to close tolerances difficult. "Teflon" must be machined from rod stock when tolerance is a critical factor.

Special machining problems. Standard cutting techniques cannot be applied to "Teflon" machining, according to Mr. S. Mulay, President of Tri-Point Plastics, Inc., Albertson, N. Y. His firm, which specializes in working DuPont's new product, had to invent new cutting techniques and retrain operators to cope with "Teflon's" special characteristics. In spite of these steps, the materials—tools and lubricants—used in the machining process still gave Tri-Point trouble.

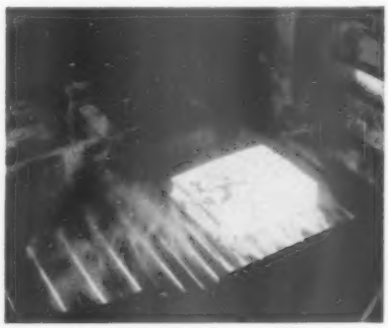
Cutting oil a critical factor. It soon became obvious that standard cutting oils used for ordinary metalworking were not adequate for "Teflon" machining. Although "Teflon" is not an abrasive material, its very low thermal conductivity coupled with its high heat resistance tended to shorten tool life by actually burning cutting edges. These high temperatures also warped the machined part, making close tolerances almost impossible. Finally, "Teflon's" white color made it extremely difficult to see the work through soluble oil emulsions—which otherwise might have solved the problem.

Tri-Point calls in Texaco. At this stage Tri-Point turned to the expert — a Texaco Lubrication Engineer. He outlined the need: a transparent cutting oil with the ability to remove the maximum amount of heat. After considerable study and testing, he recommended switching to Cleartex BX whose characteristics seemed precisely to fit the situation. His choice has proved to be right. Now Tri-Point uses this oil exclusively, with excellent results. Tool replacement has dropped significantly, and Tri-Point can count on maintaining "Teflon" tolerances of .001".

Pressure plus heat presents two-way lubrication problem

There is a definitely established trend today toward higher and higher temperatures in industrial processes in almost every type of industry. Mill rolls, plastic extruding machines and steam joints are only a few of the many applications which now involve temperatures well over 300° F. combined with high pressures. This combination has presented a severe lubrication problem — particularly in grease-lubricated equipment.

Nature of grease creates problem. As temperature rises, the consistency of grease decreases — most greases become virtually useless at temperatures above 350°. Furthermore, high heat will usually cause rapid oxidation and deterioration in a relatively short time.

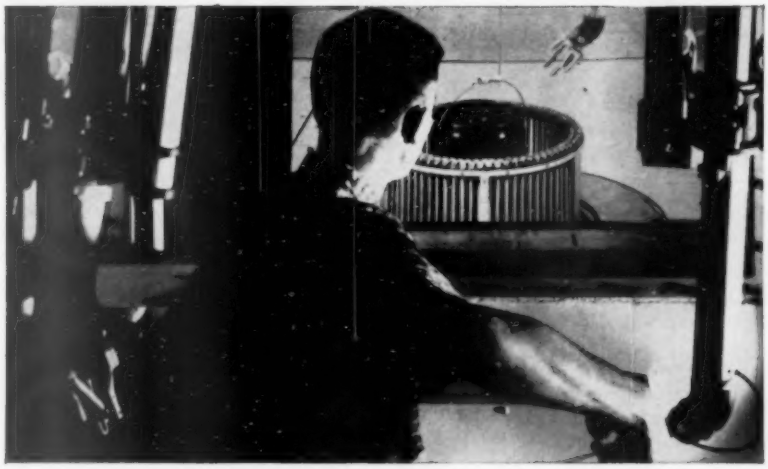


Unique new grease resists both forces. Texaco has now developed a new product whose remarkable performance in two years of field tests seems to answer the problems of *both* high heat *and* extreme pressure—Thermatex EP-1.

Thermatex is unique in its high resistance to both these forces.

Protects 400° equipment for two years. Thermatex has been field-tested for two years as the lubricant for steam joints in a paper mill. Previous products used had solidified and coked after two weeks of exposure to the extreme pressures and 400° F. heat, causing failure of the joint. Thermatex, on the other hand, has kept the steam joints operating without failures—and without significant wear—for two years.

news



GAMMA-RAY "HOT CELL" AT BEACON contains radioactive Cobalt-60.

Nuclear energy harnessed to crack the secret of better lubricants

Lubricants finer than the ones available from even the most advanced standard refining techniques will soon be produced by Texaco—with the help of nuclear radiation. Completely *new* lubricants are a real possibility, too—lubricants with atomic structures stronger and more cohesive than anything now available.

To open up this new frontier in lubrication, Texaco has assembled the most fully equipped nuclear laboratory in American industry. Texaco scientists have been put in command of all four basic irradiation forces—electrons, positive ions, gamma rays and neutrons—and are now probing the activity of hydrocarbon molecules during refining.

In addition to the Cobalt-60—rated at 29,000 curies—Texaco scientists have at their disposal a 6- to 10-million electron volt linear accelerator and a 3-million electron volt positive-ion Van de Graaff generator. The linear accelerator, or "electron gun," was especially designed and built for Texaco and is probably the only nuclear instrument of its kind now in use by a commercial firm for its own fundamental research.

Searching analysis of deposit problems

The January 1959 issue of *Lubrication Magazine* is entirely devoted to deposit problems—their causes, prevention and solutions. This article should be of vital concern to every engineer who has to cope with this often-costly lubrication problem. See coupon.

TUNE IN...Metropolitan Opera Radio Broadcasts Every Saturday Afternoon

MOVIE OF THE MONTH

★★ SEE! ★★

"HYDRAULICS"

"One of the year's most informative movies!"

—Paul Rolnick, Editor, *Applied Hydraulics*

NEW PRODUCT NEWS

Nondrying protective coating keeps parts free from rust and corrosion for as long as a month during inter-process handling, storage, and shipment: *Texaco 564 Rustproof Oil.*

New, easy-to-apply gear lubricants won't drip in hot weather or flake off in cold—are ideal for many open-gear applications: *Texaco Geartac.*

How working splits grease fibers.

80,000x electron microscope explores grease structures

One of the most important tools of research, the electron microscope, is helping in the development of new and better greases. By understanding the nature of grease structures and their reaction to various conditions, Texaco scientists can create greases that are suitable for many different purposes.

THE TEXAS COMPANY, Dept. F-LN-11
135 East 42nd Street
New York 17, New York

Dear Sirs:

☐ I am interested in seeing "HYDRAULICS"

I would like a free copy of

☐ Lubrication Magazine – January issue

☐ Management Practices that Control Costs via Organized Lubrication

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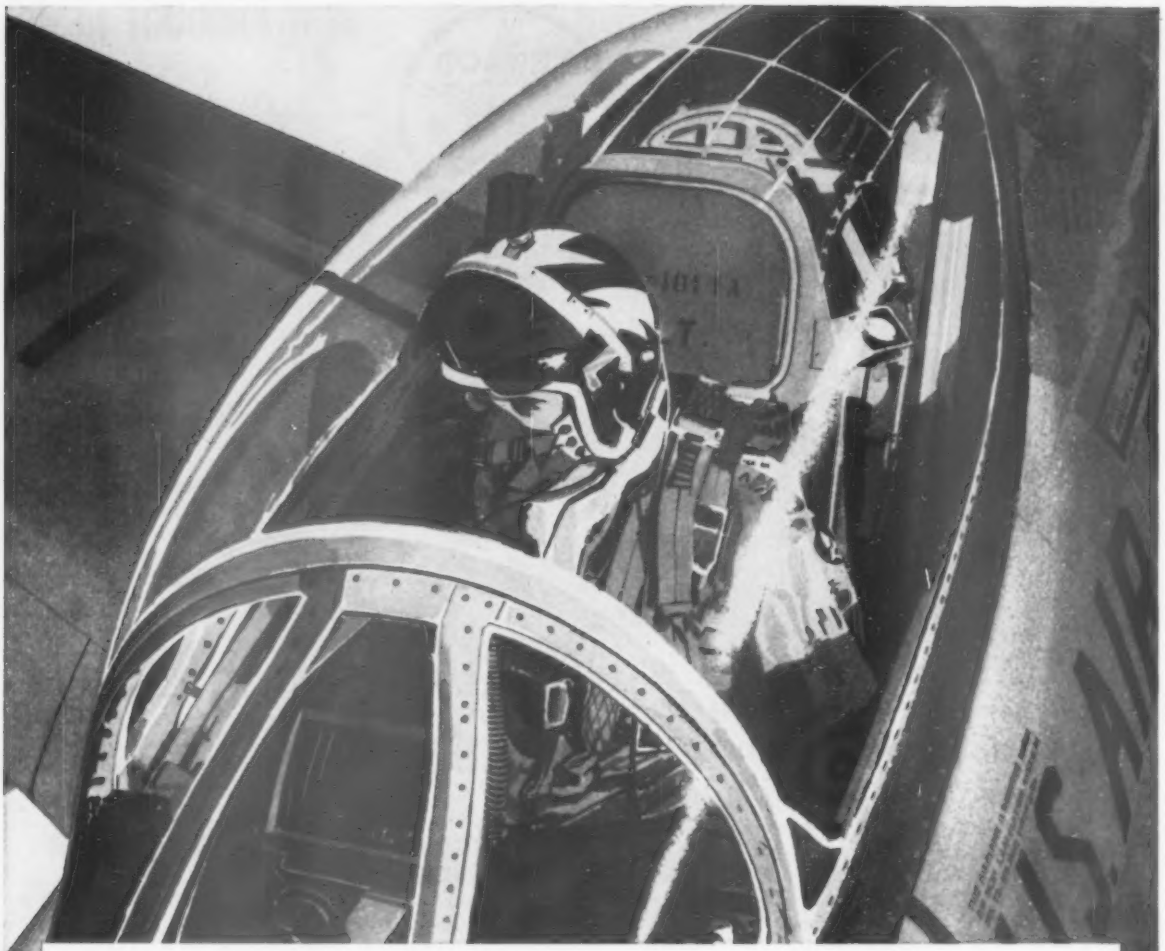


This "bubble" owes its complexion to Polyken® tape

NOT A SCRATCH . . . NOT A DENT . . . THANKS TO THE MODERN METHOD OF SURFACE PROTECTION

The cockpit canopy of a fighter plane can be easily scratched during manufacture. So makers of supersonic aircraft take no chances. They protect its relatively "soft" surface with pressure-sensitive tape.

Not just *any* tape, though. Canopies are too valuable for that. Throughout handling and storage, they're covered with special Polyken tape.

Whatever surfaces you want to protect (from soft plastic to tough steel), there's a Polyken tape that unwinds easier, conforms better, gives superior surface protection, and pulls off clean.

THE MODERN TOOL . . . AT WORK FOR MODERN INDUSTRY

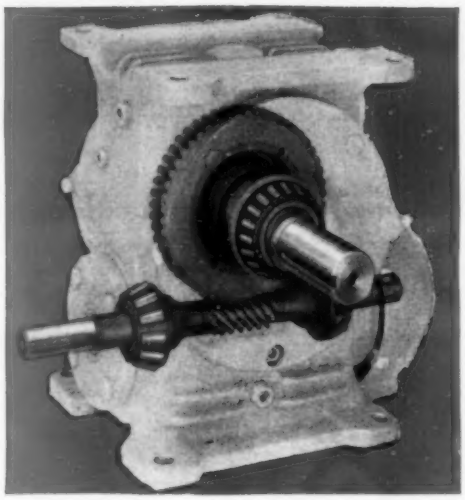
For advice on your surface-protection problem —check with the Polyken Industrial Tape Distributor nearest you, or write to the Polyken Sales Division, 309 W. Jackson Blvd., Chicago 6, Illinois. Dept. FM-3

Polyken

INDUSTRIAL TAPES

THE KENDALL COMPANY
Polyken Sales Division

NEW LINK-BELT
UNIVERSAL
worm gear speed reducers



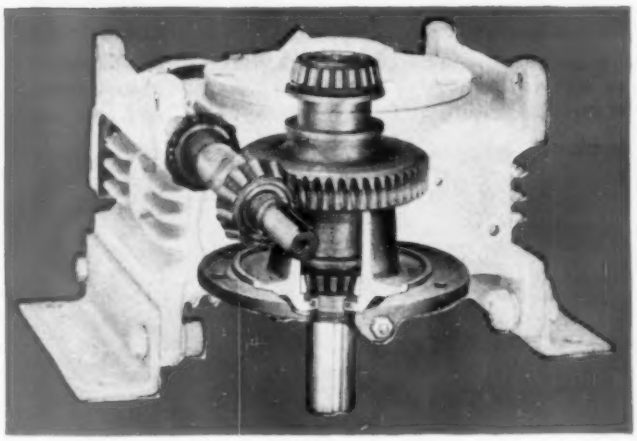
- *three mounting positions*
- *more hp per pound, per dollar*
- *available from stock*

IN *all* ways, Link-Belt's new *Universal* sets the pace among worm gear speed reducers. Its simple, compact design offers more usable hp in a smaller housing . . . holds down initial cost . . . minimizes mounting space. And with simple changes of oil gauge and breather, the *Universal's* versatile housing can be mounted in positions B, T, and V as shown.

The *Universal's* mounting versatility is matched by its performance versatility. It permits operation at high input speeds with fractional or large hp motors, provides moderate or slow output speeds with ample capacity for heavy loads, assures smooth transmission of power at right angles with high efficiency and minimum maintenance.

MOUNTING B — worm shaft below gear.

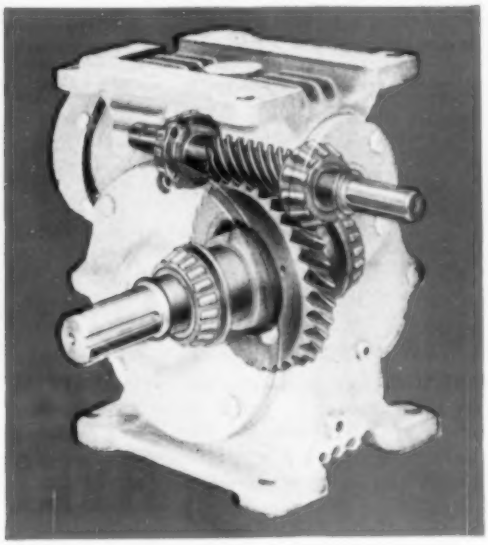
Universal worm gear speed reducers available in 2½, 3, 3½ and 4 inch centers with ratios of from 5⅓ to 60 to 1. For details, call your Link-Belt office or authorized stock-carrying distributor—see *SPEED REDUCERS* in the yellow pages of your phone directory. Or write for Folder 2724.



MOUNTING V — Output shaft vertical—upward or downward.

LINK-BELT

SPEED REDUCERS



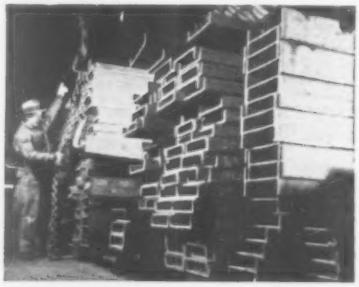
MOUNTING T — worm shaft on top of gear.

LINK-BELT COMPANY: Executive Offices, Prudential Plaza, Chicago 1. To Serve Industry There Are Link-Belt Plants, Sales Offices, Stock Carrying Factory Branch Stores and Distributors in All Principal Cities. Export Office, New York 7; Australia, Marrickville (Sydney); Brazil, Sao Paulo; Canada, Scarboro (Toronto 13); South Africa, Springs. Representatives Throughout the World. 15,015

REPORT FROM RYERSON
on Services and Products in Stock

In addition to the products shown below, you can call on Ryerson for flame-cut steel shapes, fabricated steel for reinforced concrete or steel frame construction—many other products and services. And equally important are the specialists who carry out the Ryerson quality control program —see that customers specifications are *exactly* met, that every order is correctly filled and promptly delivered. As a result you get unequalled service and certified quality when your company calls Ryerson for steel, aluminum, industrial plastics and machinery.

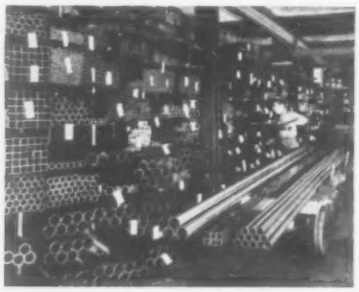
CARBON STEEL & ALLOY BARS Most complete range of types, shapes and sizes as well as largest tonnage.



STRUCTURALS—I-beams, H-beams, channels, angles, tees and zees—all high quality steel to ASTM spec. A-7.

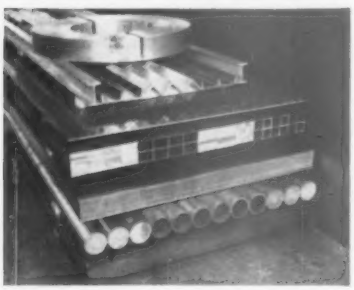
PLATES—14 types including special low carbon steel plates for forming and welding, leaded New E-Z-Cut, etc.

SHEET STEEL & STRIP—More than 20 different types in pattern sizes, cut-to-order sizes, strip coils, etc.



TUBING—Seamless and welded steel tubing—mechanical tubing, fluid line, pump cylinder and structural tubing.

STAINLESS STEEL—For immediate delivery. Over 2351 sizes, shapes, types, finishes: sheets, plates, bars, pipe, etc.



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For more facts Circle 485 on Reader Service Card

FACTORY . . . PRESS TIME REPORT • MARCH 1959

Looking Ahead in Business

You've got strong reasons to fear a new round of cost-push pressures in 1959. New wage contracts are to be signed in a number of major industries—including steel. And corporate profits this year will provide an inviting target for labor.

•

From the low annual rate of $32-billion in the first half of 1958, profits before taxes rose to a $45-billion rate in the final quarter of '58.

Right now profits are running even higher—might be close to a $50-billion annual rate by midyear. Aside from being a large round number—in fact, the largest ever—there's nothing sinful about a $50-billion rate of profits. It would be no higher as a percentage of national income than profits in 1948, 1950, 1951, 1952, or 1955.

The point is this: In 1948 and 1955 high profits were followed, soon after, by strenuous wage demands and, not much later, by inflationary wage settlements. In 1951 and 1952 we had both price controls and excess profits taxes.

•

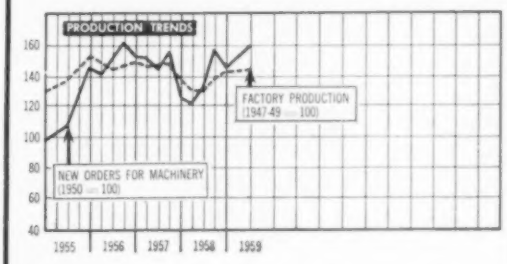
In spite of these unhappy precedents it seems the current situation is different enough to permit a good business year without serious inflation.

The present pick-up in business profits is the result of a sharp gain in productivity, which has come about because most companies insist on holding down costs and keeping prices competitive. It is not the result of a war (as in 1950-52) or a frantic rush to make up past shortages (as in 1948 and 1955). That kind of market is far behind us.

In the present atmosphere it would seem logical that demands should meet strong employer resistance. Of course this attitude should not apply to every wage increase—but certainly to wage increases that greatly outdistance prospective gains in efficiency.

If industry is prepared to hold this wage line through a period of strenuous bargaining and strike threats—or at least not to retreat much—the prospects for avoiding inflation are far better than in previous years of general prosperity.

FACTORY FIGURES OF THE MONTH



Indicator	Jan. 1959[p]	Dec. 1958[r]	Jan. 1958
New Orders for Machinery (exc. elec.)[1]	161.0	140.0	125.0
Contracts for Industrial Construction[2]	97.0	80.0	99.0
Factory Production[3]	145.0	144.0	135.0
Consumers' Prices (cost of living)[4]	123.7	123.7	122.3
Industrial Prices (materials, supplies)[4]	127.5	127.2	126.1
Manufacturing Employment (millions)[4]	15.6	15.8	15.9
Total Employment (millions)[5]	62.7	64.0	62.2
Unemployment (millions)[5]	4.7	4.1	4.5

[p] = preliminary [r] = revised

Sources: 1. McGraw-Hill Dept. of Economics (1950 = 100); 2. Engineering News-Record (1950 = 100); 3. U. S. Federal Reserve Board (1947-49 = 100); 4. U. S. Dept. of Labor, Bureau of Labor Statistics (1947-49 = 100); 5. U. S. Dept. of Commerce, Bureau of the Census.

There are no important shortages of materials or of plant capacity. The monetary authorities continue to hold a firm grip on the supply of money and credit, permitting minimum expansion only. And strong steps are being taken to reduce the deficit in our badly out-of-balance budget.

•

The actual course of events in the upcoming struggle between wages and profits will probably be less dire than most forecasters are expecting.

Even assuming some ample wage settlements, corporate profits should average out at a very good level for 1959—perhaps in the range of $47- to $48-billion.

If there is not much inflation, these profits will really mean something in terms of ability to purchase new plant and equipment. So by the latter part of 1959 business will have accumulated enough cash to finance record capital expenditures if it wants to.

Ideas of the Month

(For more information, circle item numbers on Reader Service Card next to back cover)

Those new Power-Groove fluorescents (*General Electric*) produce 15% more light, yet consume only 7% more electric power! **(314)**

Booklet of the month is "Belt Conveyor Idlers" (*Link-Belt*), whose 40 pages contain selection data on five new series and 23 types, illustrate their versatility for wide range of conveyor applications. **(315)**

Latest in skylights appears to be Consolite (*Consolidated General Products*). It's a twin-domed plastic bubble, glass-fiber reinforced. And comes in green, white, pink, yellow, blue! **(316)**

Radiation monitoring is booklet (*Eastman*) with much new data on use of film to record x-, gamma-, beta-rays—or to monitor neutrons. **(317)**

Any spheres in your plant? Revolving scaffold (*Atlas*) is specially designed for maintenance work inside 'em. **(318)**

Fiber-Aire is a power ventilator (*Swartwout*) made of heavy, shock-resistant Fiberglas. Since this is a non-resonant material, it eliminates sound-chamber effect created by conventional centrifugal units. **(319)**

You'll add years to life of heavy-traffic floors with new AIM floor plates (*Acme Steel*). They're 11¾ in. square. Small rectangular holes produce anchoring prongs that are embedded in concrete. **(320)**

Electroluminescent lighting panels (*Westinghouse*) can now be had in standard sizes from 2x2 to 24x24 in. Green, blue, yellow. **(321)**

Colorail is a thermoplastic handrail (*Blum*) available in gray, red, black, gold. It's corrosion-resistant, non-flammable. **(322)**

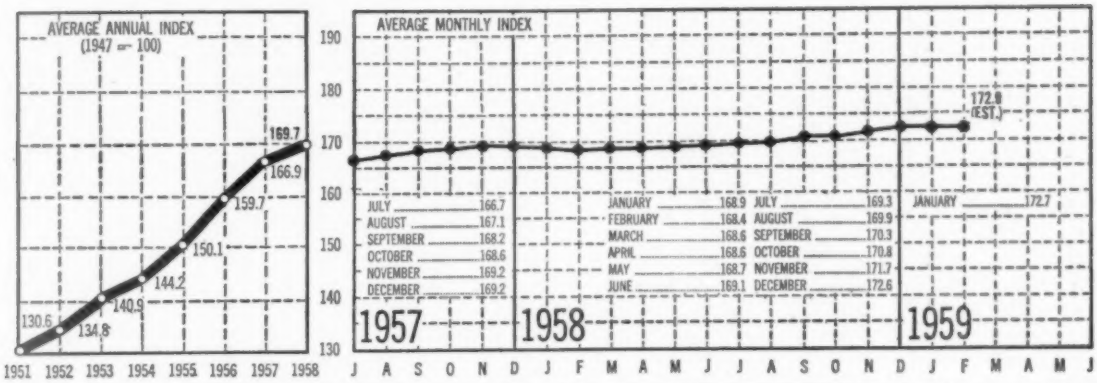
Nut drivers with "inside-outside" hex heads (*Hunter Tools*) get into extra-tight places. From 3/16 to ½ inch. Color-coded handles. **(323)**

With Freon T-F (*Du Pont*) you can scour out a motor simply by removing end bells. Won't attack insulation. No need to disconnect motor, and you can put it right back in service. Non-flammable, completely non-toxic. **(324)**

More Ideas of the Month on pages 158 and 159

FACTORY . . . PRESS TIME REPORT • MARCH 1959

Cost Index of Plant Maintenance



Index Inches Up in January

Building costs are expected to rise even more rapidly in the year ahead.

FACTORY'S Cost Index is closing in on the 173 mark. It reached 172.7 in the first month of 1959. The January figure was more than 2% higher than the comparable one for the opening month of 1958.

As in December, nine materials out of the list of 39 cost more in the new month than in the previous month. Only five items cost less, while 25 cost the same.

Building costs will probably move ahead more rapidly in the coming months than in 1958. As an indication of this trend, two of the nine items that registered an increase in cost in January were brick and lumber—both basic building materials. Another indication of this rising trend in building costs is the recent increase in hourly earnings of carpenters and painters. Aside from plant construction, building is heading into its biggest year.

There is more public concern today about inflation than at any time since World War II. But there is actually a lot less danger of inflation right now and for the next six months or so. The nation has impressive reserves of all facilities for producing goods. There's a hoard of surplus copper in the stockpile. We have nearly 40-million tons of reserve capacity in the steel industry—and this in spite of the tremendous burst of new orders for steel to beat a possible strike and subsequent price increases. With this adequate supply of facilities it's going to take some weird changes in the basic laws of economics to produce rapid inflation in the coming months of 1959.

	AVERAGE 1958	JAN. 1959 (Preliminary)	DEC. 1958 (Revised)
Building and Facilities Index	160.8	164.4	164.1
Materials	139.2	141.2	141.2
Brick	148.8	151.4	150.5
Elec. fixtures	128.9	127.8	128.9
Elec. switches, boards, fuses	181.5	180.7	180.7
Elec. wire, copper	122.5	130.6	130.6
Glass	152.2	152.0	152.0
Gutters, spouts, ducts	172.9	178.8	178.8
Gypsum products	139.8	140.8	140.8
Heating equipment	127.4	127.9	127.9
Lumber	124.9	127.6	127.1
Millwork	146.9	148.8	149.5
Paint	130.1	130.0	130.0
Pipe, cast iron	170.4	170.4	170.4
Pipe, steel	192.0	192.7	192.7
Pipe & tubing, copper	145.7	150.9	150.9
Roofing	120.4	126.4	126.4
Sanitary fixtures	145.0	147.8	147.8
Sash, metal frame trim	146.9	145.2	145.2
Solder	117.5	121.9	122.3
Steel, structural	231.3	236.3	236.3
Tanks, steel	138.4	138.5	138.4
Valves & fittings	160.6	163.9	163.5
Wire mesh	160.8	161.9	161.9
Labor	175.2	179.8	179.3
Carpenters	160.7	164.6	163.6
Electricians	183.5	188.7	188.7
Painters	181.3	186.2	185.6
Equipment Index	173.6	176.3	176.2
Materials	173.5	174.3	174.1
Abrasives	160.3	160.3	160.0
Alloys, non-ferrous	117.2	121.8	121.9
Bars & plate, steel	223.5	227.2	227.2
Bearings	163.4	160.3	160.3
Belting	150.5	156.9	155.9
Bolts, nuts & screws	229.5	225.3	225.3
Chain	184.0	184.0	184.0
Controls (electrical)	181.5	180.7	180.7
Gear-reduction units	181.7	181.7	181.7
Hand tools, mechanics	192.9	197.3	195.8
Lubricants	122.8	123.0	123.0
Motors	147.2	147.6	147.6
Non-ferrous metals	120.9	128.1	128.1
Precision tools	153.2	153.2	153.2
Pumps	184.8	193.9	191.3
Tools, cutting	166.3	168.1	168.4
Valves & fittings	160.6	163.9	163.5
Labor	173.7	177.6	177.6
All mfg. labor	172.2	177.1	177.1
Machine tool labor	175.2	178.0	178.0
FACTORY'S COST INDEX	169.7	172.7	172.6

FACTORY . . . PRESS TIME REPORT • MARCH 1959

Looking Ahead in Labor

A stunner has hit union economists who have been predicting a rosy bargaining year. Advance forecasts at AFL-CIO headquarters have all been for settlements outscoring 1958—even though this average was a respectable 10¢. But further accounting shows the averages may well fall below last year—even though negotiated raises will likely be higher.

•

The paradox goes this way: Most of the big union contracts have escalator clauses, hiking pay with rising living costs. In 1958 the Consumers' Price Index (CPI) rose enough to lift the pay levels to almost double their expected return.

For instance, the United Steelworkers collected 9¢ in flat pay, another 9¢ with the rise in living costs. Total, 18¢. Or take the United Auto Workers. Walter Reuther negotiated last year for a flat 6¢ to 7¢ hike. The advance in the CPI hiked this to 13¢. This year UAW again collects the same flat pay raise. The total may be much lower.

•

Government price experts predict stability—or just a slight rise—for the price index through the year. As a result the unions will lose their extra pay adjustment. Even though Reuther and associates complain these are not "real" wages, they're welcome in the worker's pocketbook. Thus the prospect of getting a higher pay settlement in 1959, but not as much total, is good.

On top of this, labor's optimism over good settlements may have to be adjusted. New resistance to demands is building up.

U. S. Steel's chief negotiator, R. Conrad Cooper, blames the USW for pushing inflation. This union, he says, "has been the spokesman and moving force in securing a procession of inflationary wage and related employment cost increases." He predicts the steel industry will resist "inflationary" wage demands. And Lewis Strauss, Secretary of Commerce, has advised businessmen to put up strong resistance against heavy demands.

Much of this talk is advance bargaining, laying out the proper atmosphere. But the current concern over inflation makes the words mean more.

Labor leaders are talking big organizing. A recent strategy meeting by AFL-CIO's top organizers and union presidents came up with this: The field is fertile for organizing.

AFL-CIO Organizing Director John Livingston, commenting on the effects of labor racketeering revelations, says, "The peak of damage has now passed." So at their closed session union leaders talked goals. In a nutshell: 14-million white-collar workers and 6-million Southern industry employees.

The organizers also talked tactics. They're convinced they need a new set of organizing blueprints to break into these two tough areas. The old fire-and-brimstone tactics won't do. Organizers must now wear ties, talk the language of the office worker. This means readjustment among the ranks of old-line organizers. It's just now getting under way.

•

A labor reform bill with no Taft-Hartley amendments. That's one prospect—the best at this point—on the outcome of the current anti-racketeering labor legislation in Congress.

Proponents from both parties—Senator John F. Kennedy (Democrat) and Secretary of Labor James P. Mitchell (Republican)—show willingness to trade away T-H for a reform bill restricted to controls and changes in union operations. These include secret ballot elections, full reports by union officers on union finances—and their own.

But when it comes to amending T-H, they may have to wait until later. Labor and businessmen want amendments, but it's almost impossible to get Congress in the mood to do anything about them.

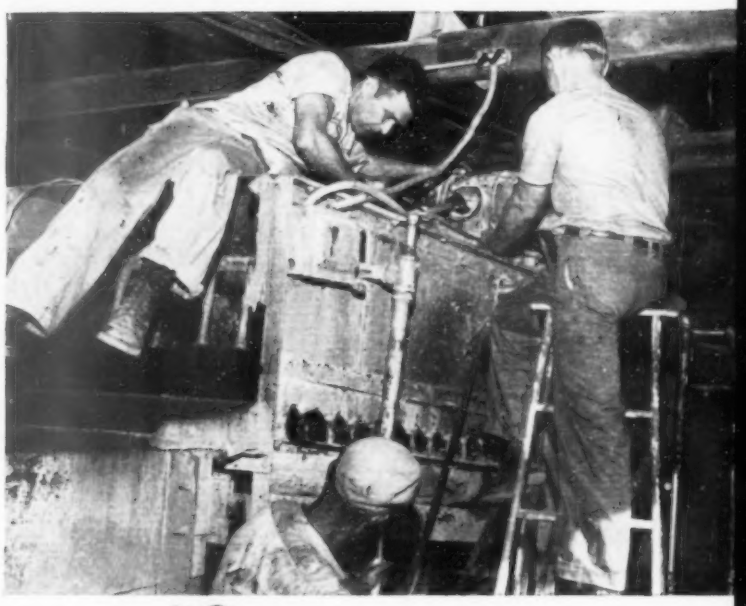
Even after the reform bill goes through Congress (likely), a broad T-H bill will be presented. But it's not likely to leave Congress.

•

Craft and industrial union jurisdictional troubles are easing up. The first real advances toward ending the long-time scrap are appearing from details of a working peace plan. More than 100 job fights have gone through this AFL-CIO peace machinery. Only 8 have come away unsettled.

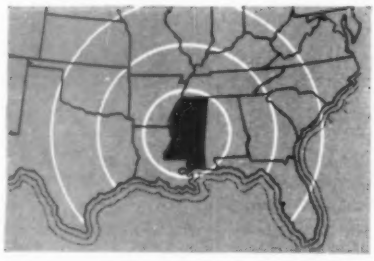
SEE LABOR RELATIONS NEWS, PAGE 176

Know Growing Mississippi



Room for Business

Time for Living



Industry profits best where the opportunities for good living match the opportunities for doing business. In both these advantages, Mississippi measures up. Take weather, for example. Average temperature is 64.5. Snowfall averages less than one day per year. No need to worry about costly plant shutdowns or worker absenteeism due to bad weather. Pleasant, year-round recreational activities add an extra measure of happiness to life in Mississippi.

Mississippi's famed Balance Agriculture With Industry program (BAWI) can finance your new plant in a community of your own choosing, as well as grant you tax exemptions of five to ten years.

Let Mississippi share with you the good business climate and pleasant living that make it **America's No. 1 state of industrial opportunity.**

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Average rainfall - - - - - 50 inches
Average max. temp. - 77.4 degrees
Average min. temp. - 54.4 degrees
Average growing season -
241 frost-free days per year
Average humidity -
at 7:30 a.m. - 87%
at 1:30 p.m. - 54%

STAKE YOUR FUTURE IN GROWING

Mississippi

FREE BROCHURE. *Here is a helpful, informative booklet about Mississippi's industrial opportunities designed especially for your plant location file. Write Dept. F, Mississippi Agricultural and Industrial Board, Jackson, Mississippi.*

For more facts Circle 486 on Reader Service Card

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FACTORY . . . OPINION

Needed: a Sharp Eye on Change

The National Industrial Conference Board recently called attention to a substantial change that has taken place over the past ten years in the make-up of the manufacturing labor force. Between 1947 and 1957, the NICB points out, the number of white-collar workers in manufacturing has increased from 16% of total employment to 23%.

This is an important change. It results from rising manufacturing productivity, which basically calls for fewer producers and more controllers, planners, and managers of production.

This change, of course, isn't news. It has long been obvious to anyone who spends a lot of time in manufacturing plants. But it *is* news to learn the extent of the trend.

If this trend should continue at the same rate for another ten years, it's not unreasonable to expect that one worker out of every three in manufacturing will be in the white-collar class.

Here we begin to see the real impact on plant management of the technological progress that many of us discuss so glibly—and often, so superficially. It becomes increasingly evident that important changes are taking place in organization and management, as well as in manufacturing technique. These changes are complicated and interrelated. They don't follow a simple plan; they rarely start in the same place; they are never entirely predictable. In a word, you can't really tell how important the impact of technological change is going to be until you size it up in relation to a specific plant's operations and costs.

Nor can you readily tell what will kick off the process of change in any given plant. Sometimes it's a new piece of equipment that can be bought outright. Sometimes it's an equipment or process modification that's home-grown. Sometimes it's a new material or a change in the product, or both. But, regardless of where it starts or why, it almost always results in significant change in management—the concept, the approach, and the execution.

One interesting example of such a process is on page 228 of this issue of FACTORY. It happens that the starting point in this case was a new "sandwich" material with unusual insulating properties, making possible an extraordinary simplification of the traditional process of manufacturing refrigerators.

Result: An upheaval in management in Westinghouse's appliance plant in Columbus. Here are just a few direct quotes from our story to give you the flavor:

Equipment: "Saws, routers, and simple tools and fixtures are all that's needed to make Westinghouse's new refrigerator box. For old-timers . . . the saws and routers are like a voice from the past . . ."

Layout: "The new material is far less complicated. Simple, short-line layouts are best for it."

Maintenance: "Generally speaking, the plant will be much easier to keep clean."

Management: "This means a broader job, more direct responsibility."

Quality control: "One mistake ruins the whole show. There's no chance to do it over . . . Manufacturing reliability takes on the flavor of performance reliability —a flavor that's sweeping the thinking about quality control these days."

Materials handling: "Lighter products, bigger losses from handling errors, shorter production lines—all add up to new concepts in handling."

Economics: "You can't sit back and figure you've made lasting decisions. The variables can change almost overnight."

The moral? It's pretty obvious, but here it is anyhow: The growing proportion of managerial and other white-collar jobs in manufacturing industry isn't just the devil's invention to boost overhead. It's the best single measure available today to drive home the impact of the changes that have been taking place—changes that require *us* to change too. And let's not forget that this is no abstract business of words on paper—though that's all it is here. After all, what happened to Westinghouse in Columbus yesterday could also happen to you somewhere else—wherever you are—today or tomorrow. And probably will.

This Is PHIL CARROLL...

FACTORY editors bearded this industrial lion in the den of his Maplewood, N. J., home. He isn't often there. More likely he's somewhere out on a plant floor putting into practice the cost-control theory he preaches. And Phil, in our opinion, has given more effective thought to the subject of cost control than anyone else living today.

Thousands of plant operating managers know Phil as Mr. Cost Control because he has worked side by side with them. He's done notable work in (1) time-study measurement for wage incentives in direct and indirect labor and (2) pioneering applications of budgets, standard costs, product overhead analysis.

Hundreds of thousands know Phil through his published works—his six books (translated into Dutch, French, and Japanese) and over 100 published papers. Many an industrial engineer cut his eyeteeth on Phil's basic text—*Timestudy for Cost Control.* And then enriched his knowledge with *How to Control Production Costs, How to Chart Timestudy Data, Better Wage Incentives, Timestudy Fundamentals for Foremen,* and *How Foremen Can Control Costs.*

Thousands of management people know Phil for his efforts on behalf of the profession. This year Phil was elected president of the Society for the Advancement of Management. He is also a fellow of ASME, a past president of the New Jersey Technical Societies Council, a past regional and vice president and life member of AIIE, a member of the National Office Management Association and the National Society of Professional Engineers, and a director of the Council for International Progress in Management.

Still other thousands know Phil for his honors. Phil holds the Gilbreth Medal (1950), SAM's Industrial Incentive Award (1953) the Northern New Jersey SAM's Distinguished Service Award (1959), and an honorary M.E. degree and citation as a Distinguished Alumnus of the University of Michigan.

Thousands more know him from his lecture platform. A lean, incisive figure, dogmatic and firm in his belief in measurement and standards, Phil's platform presence is an inspiration and a challenge.

Over the years Phil Carroll has moved toward his goals with a swift, sure step. From the University of Michigan in 1918, to the Army Signal Corps in World War I, to Westinghouse, Phil laid the groundwork of his cost-control beliefs. Later, as a founder and vice president of Dyers Engineers, Inc. (Cleveland), Phil applied his knowledge of time-study measurements to general management problems. Since 1940 he has been an outstanding success in his own practice as professional engineer.

FACTORY knows of no other personality who has contributed so much to understanding and improving industrial management through effective cost control. For this reason FACTORY brings to its readers this special report from Phil Carroll.

...and here's what he says about

COST CONTROL— Past, Present, and Future

FACTORY editors went to Phil Carroll for an updating on industrial cost control. We asked him:

What does the history of scientific management tell us about cost control? Where do we stand today? In what direction will we be moving in the next 10 years?

Without qualification or doubletalk, Phil Carroll, cost-control savant without peer, gave us his views on the state of the art in 1959.

As he sees it, bigger plants, more supervisors in controlling situations, enlarged staff activities, accelerated production, increased mechanization, and more complex distribution systems have forced industrial management in the last 40 years to some sound conclusions about cost control as it was, as it is today, as it will develop tomorrow. Here in a nutshell is what Phil Carroll sees:

WHAT THE EARLY DAYS TAUGHT US

- **Cost variations must reflect managerial performance, not volume dips and rises.**
- **Constant costs for people and equipment can't be altered by switching production to "low cost" departments.**
- **Managerial improvements in production inherently raise the rate and the amount of overhead.**
- **Overhead costs must be broken down and assigned according to product, process, markets, and customers.**
- **Cost-control measures must be designed for managerial use, not for accounting purposes.**

WHERE COST CONTROL STANDS TODAY

- **Flexible budgets have reduced some of the cost confusions.**
- **Supervisory incentives are helping to pin down cost facts and to assign responsibility, but. . .**
- **We're still too careless about money.**
- **Budgets based on averages won't help much.**
- **Productivity increases will depend upon improvement of indirect labor efficiency.**
- **Ignorance of product costs is still the weakest link in cost control, and . . .**
- **Managerial errors, not employee indifferences, are still the biggest cause of cost leaks.**

HOW THE FUTURE LOOKS

- **Managers will have to know more about accounting than the accountants do.**
- **Industry must wake up to the fact that managers lose as well as make profits.**
- **We will need many more facts if we are to cut control lag and reduce errors.**
- **We must, of necessity, build control indicators that sort out overheads, separate cost variances that result from arithmetic, and measure indirect work. And finally . . .**
- **Managers must learn to convert cost controls into profit-making action.**

Now, for the full story of the Past, Present, and Future of Cost Control by Phil Carroll, Professional Engineer, Maplewood, N.J., turn the page

COST CONTROL . . . *Begins on page 62*

"The basic reason for cost control is to improve profits." That's one thing Phil Carroll saw clearly at the outset of his career. Here he cites five historic cases, tells how today's principles grew from yesterday's mistakes. He's telling . . .

How Cost Control Grew Up

"EASTA PITTSABOIG" Westinghouse inspired my interest in cost control in 1919. Since then, production has become much more diverse with new styles, sizes, and designs. Plants have been expanded and multiplied, with vastly more supervisors who must control costs in their parts of our companies. Staff departments have been enlarged and added. Wage costs have been raised repeatedly. Speeds of production and of distribution have been accelerated.

Taken together, these changes have greatly increased our needs for cost control. Perhaps some experiences or cases, with lessons learned, will show where weak spots in costing methods have had to be corrected to achieve better cost control.

MISTAKES I REMEMBER

• **Case 1**—Long ago I asked a works manager, "How did we make out last month?" He replied, "We lost lots of money. But I can't be too upset. January is our slack season." Six months later he said in reverse, "We made nice profits. But they don't mean much. July is our busy period." These two opposing versions caused me to wonder, "What good are operating statements given to a manager when he must discount the figures he gets?"

This works manager's reports concealed what we might call "volume variance." In simple terms, $\frac{1}{12}$th of his constant cost was charged to January's $\frac{1}{20}$th of the year's business. And in July $\frac{1}{12}$th of his constant cost was charged to $\frac{1}{8}$th of the business.

Conclusion: Separate the cost changes due to variations in volume of business so as to reflect only cost changes resulting from managerial performances.

"If we ever get to full automation, all of us will be considered a part of overhead and our ratio will be infinity."

• **Case 2**—Time studies showed 46% idle man-time in a two-man operation. To remove one man meant a loss in production of 17%. Making up this loss required more machine hours—overtime on the machine involved or running another machine that was idle. Here I ran into a machine-hour cost block. The idle machine carried a $10 cost per hour whereas the one we were running cost $4 per hour. I had a tough time proving that the constant costs of our two machines were $15 per hour, running or idle. We couldn't reduce these machine-hour costs, but we could save payroll cost.

Conclusion: Constant costs of a going concern—

"people costs" as well as those of plant and equipment —are not changed very much by moving production from one machine or department to another.

• **Case 3**—This manager who looked at overhead as a ratio to direct labor nearly had a stroke when his ratio doubled. This doubling was caused by three changes. First, we created a time-study department. That added dollars to his overhead. Second, our work measures separated waiting time and indirect labor formerly buried in day work. Since these were overhead, more dollars were transferred upstairs. Third, increases in productivity caused further reductions in direct labor. Thus his new ratio was the result of dividing increased overhead dollars by a much smaller direct labor cost. Neither he nor I knew then that if we ever get to full automation, all of us will be considered a part of overhead and our ratio will be infinity.

"If you look through the cloak of accounting mystery, you'll find that cost-center rates can be almost any number."

Conclusion: Every advancement in management tends to raise both the amount and the rate of overhead.

• **Case 4**—My most startling experience came when my task was to find out what products were profitable in a foundry. Costing had been done on a pound basis. Soon it became apparent that "the more work we did on a pound, the less it weighed." Then we analyzed overhead, freight, and selling expenses. As you can guess, these overhead costs were vastly different for each of our several products, markets, and customers. To cite one example, it cost over three times as much to sell one unit to a local garage man as to sell that same unit in Detroit. Difference in quantity sold was the chief factor.

You might object to this illustration, saying, "Selling is not part of cost." I chose it, however, to point up two facts. First, our basic reason for cost control is to improve profits. Second, we can't tell where our profits are made or lost until we can compare the whole cost to make or buy, sell, and deliver with the net income from the sale of each of our several products.

Conclusion: Much overhead cost is caused by our different products, processes, markets or customers and should be analyzed and assigned accordingly in order to know where cost controls should be applied.

Naturally, I have seen many variations of the foregoing and other costing errors in my work with over 225 plants. These errors seem to carry over from the days when we made buggy whips. Perhaps the degree then was within attainable costing accuracy. In many plants, however, cost errors have led some managers to make wrong decisions. Actions they took threw costs further out of line. The simplest illustration was the attempt to raise prices as volume fell off by using the increasing actual overhead rates to make quotations. Other managers took an opposite tack and left out parts of overhead when they quoted prices.

Many of the above problems arose from the use of so-called "actual" cost methods. You may prefer the term "job cost." Either way, the ups and downs in cost comparisons probably caused the creation of standard costs. This carried with it the selection of one or more overhead rates. Also, in an attempt to unscramble product costs, many companies set up departmental, cost-center, or machine-hour overhead rates.

This setting of base lines gave managers the chance to use the "exception principle." But differing reactions were seen. For instance, newly set labor-cost standards showed one boss-man that he had a lot of waste labor cost buried in his inventory values. So he began a systematic reduction of that inflation.

In another instance the plant manager was criticized because his overhead cost was "under-absorbed." He reacted like the manager in Case 3 as contrasted with the one in Case 1. He proceeded to increase his man-hours so as to carry more overhead. As I expressed it, he put two men on one-man jobs to raise his recordings of man-hours. Later on, as you can guess, a new manager took over.

In the same vein were many instances of lack of understanding. One often seen was the notion that cost could be reduced by moving work from a high to a relatively lower overhead department. This is a natural assumption. But concealed in the rates are allotments of people-costs—planning, engineering, accounting, to cite a few—that go on just the same. Later these will be moved to the cost center where the work is done. Thus here we have another form and degree of the conclusion to Case 1.

But there was a more deep-seated confusion. Seemingly, many supervisors forgot their grammar-school arithmetic. They did not look through the cloak of accounting mystery to see that cost-center overhead rates could be almost any number. It was the simple result of dividing one number by another. To demonstrate, overhead rate was figured from a fraction:

$$\text{Overhead Rate} = \frac{\text{Overhead (Dollars)}}{\text{Activity (Output)}}$$

Usually, output is direct labor expressed in standard time, labor hours, or labor dollars. Overhead allotted may have been high or low, to give extremes. The same was true of activity. Thus we may have had a range of likely overhead rates resulting from any of at least four fractions:

$$\frac{\text{High}}{\text{Low}} \text{ or } \frac{\text{Low}}{\text{High}} \text{ or } \frac{\text{High}}{\text{High}} \text{ or } \frac{\text{Low}}{\text{Low}}$$

"Trying to unscramble product costs, many companies set up departmental, cost-center, or machine-hour overhead rates."

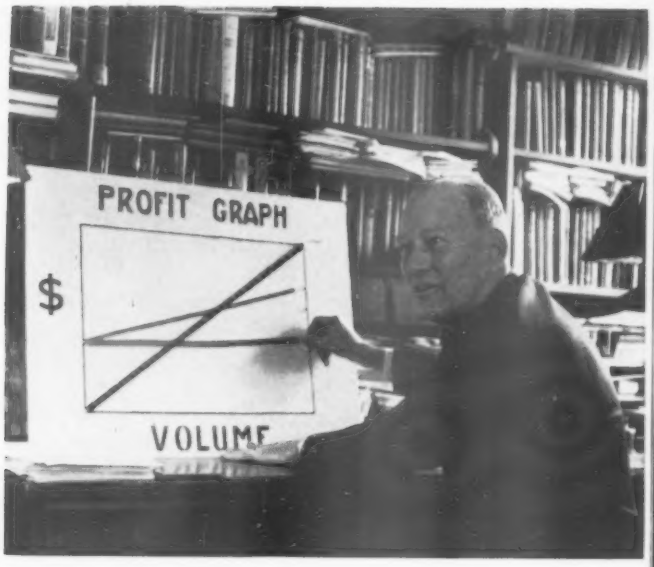
• **Case 5**—One more result of cost-center thinking should be pointed out before moving on. Figures that were used to get departmental overheads seemed to provide ready means for measuring supervisory control of costs. But they didn't. Supervisors were charged with allotments of depreciation, light, heat, power, rent, and similar costs. Thus they squawked about unfair cost charges they could not control—so didn't do much about those they could control.

Conclusion: Cost-control measures should conform with responsibilities as distinguished from accounting that relates to part and product cost.

Turn the page

COST CONTROL . . . *Begins on page 62*

"Management errors are
the true cause of cost leaks,"
says Phil Carroll as he appraises
cost-control practices in 1959.
In these two pages he tells . . .



Where Cost Control Stands Today

TODAY some of the cost confusion is reduced. For example, note how many plants are using flexible budgets. When correctly set up, these charge the supervisor with only those costs he is responsible for. More than that, most departmental budgets now include the inherent constant costs. This gets away from the over—or under—burden absorption by this department. At the same time, it makes evident that overhead ratio is an ever-changing figure depending upon what volume happens to be.

Budgets provide better cost-control tools than the operation-, part-, and job-costs we used to have. One reason is that reports comparing actual costs with budgets can be made more promptly. Another is that budgets keep together expenses for a function in contrast with putting small portions of, say, production control in thousands of part costs.

HOW SUPERVISORY INCENTIVES HELP

To improve cost control a few companies are using supervisory incentives for productivity and cost control. Such incentives have several advantages. They reward those foremen who manage better. They help to maintain differentials from incentive earnings of the men supervised. They help to measure supervisors' abilities to get out production at reasonable cost.

What's more important, they provide a means and a spur to get cost-control reports into the foremen's hands quickly. Noon on Tuesday of the week following is a practical delivery time. Such speed enables a foreman to start all the sooner to correct whatever cost leaks show up.

HOW SHORTCOMINGS SHOW UP

As we look around we see plenty of reasons why cost control is becoming more necessary. Profits have declined. Costs have gone up. Promises are that both trends will continue. Some recent contract settlements include wage increases in every one of the next several years covered. Then, too, we are making more and more promises to pay pensions, wage guarantees, and severance monies.

"We need better cost control these days because we are getting pretty careless about our money."

At the same time many companies are diversifying by adding and annexing products. Others are combining through mergers to expand their product lines. This makes cost analysis more complex. And I have to laugh when I read that some company has physically decentralized its products to get more correct costs.

Another reason I think we need better cost control is because we are getting careless with money. Our punitive tax sets up incentives to pad expense accounts and to do similar things with 48¢ profit dollars. Another assist in this silly pattern is given by cost-plus contracts.

Look also at another trend. Every day we make methods improvements. More and more plants are adding bits of automation. Consequently overhead ratios are rising. This continues while indirect and office forces are climbing—more volume, more reports, more serv-

ice. But indirect work of most kinds is not measured. So its productivity is low. You can see, then, that as we continue to increase overhead costs even though we reduce direct labor—often measured and always better controlled—our total costs will tend to rise.

NEEDED: BETTER BUDGETS

Expense budgets can't help very much in this need to control overhead costs. Usually they are dollar allotments based on past experience and so include failures of management to plan, specify, and follow up. More than that, they neither specify the work to be done nor how often. Then, too, budgets rarely vary with the product mix for a given total volume.

"I have to laugh when I read that some company has physically decentralized its products to get more correct costs."

Look at one example: Suppose it takes 10 minutes to type an invoice. Assume a simple product mix of shirts and motors. Shirts are sold in dozens that take 25 minutes to make in the shop. Motors are sold singly and require 100 minutes to make. Now see what happens to month-to-month invoicing as demands shift:

APRIL

	Sales (Standard Minutes)				Invoicing (Minutes)
Shirts:	$\frac{70{,}000}{25}$	x	10	=	28,000
Motors:	$\frac{30{,}000}{100}$	x	10	=	3,000
Totals:	100,000				31,000

MAY

	Sales			Invoicing
Shirts:	30,000	x	10	12,000
Motors:	70,000	x	10	7,000
Totals:	100,000			19,000

The volume of sales was 100,000 standard minutes in both months, whereas the work of invoicing in May was only 61% (19,000/31,000) of the work required in April. This shows just how wrong a budget that's based on averages can be.

NEEDED: INDIRECT MEASURES

It seems evident to me that our over-all national productivity will steadily decline unless we begin to raise that of the indirect workers.

Besides, from the cost-control view there are two reasons I want to stress. First is that overhead costs are too high. They are excessive because few firms have studied them. Much wasted work and duplication are carried on from habit. Many indirect operations are in about the state shop work was in when Taylor, Gantt, and Gilbreth opened our eyes. Keep in mind two significant facts: Overhead is mainly "people cost." And many overhead operations are easier to measure than the shop work we have had on incentive for years.

NEEDED: PRODUCT COSTS

The second reason why we should measure overhead work gets at what I consider the weakest link in cost control. It is our ignorance of product costs. Sure, as I have said many times before—and it is still true—we carry out labor and material costs to the fourth decimal place, but we spread on the overhead with a shovel. That makes all product costs wrong except the average. Thus managers are making marketing and cost-control decisions from misinformation.

To get better costs we must analyze overhead expenses—all of them. We must correctly assign them to the products and processes that cause them. Here is where the measurement of indirect work would help to sort overhead costs and assign them more correctly.

You might counter by saying, "We can get the same results with time-card reporting." Not so. Time cards only move the allotting from the accounting department to the individuals who make them up. These people decide what to write down or when to punch the clock. Besides, included in all actual times are what I call "management errors."

HOW MANAGEMENT GOES WRONG

Management errors are the true causes of most of our cost leaks. Employees would turn out more if we managed better. Where managers slip is in:

- Failure to get work to the people on time and in the right amounts.
- Failure to specify methods, quality, and how much work is to be done per unit of time.
- Failure to follow up on plans, specifications, changes, promises, and cost controls.

"National productivity will decline steadily unless we can raise the productivity of indirect work."

Take the simplest case. Very few foremen have positive incentives to get out the work at a specified cost. Their targets are more often delivery or output goals. Yet they are the men who have the control of costs after designs and process are set.

Basically, most operating management people are geared to "When?" and "How Much?" Without measures that answer these two questions, how can you tell whether a manager is successful? For that reason I believe you must have standards. Only after you have base lines to measure from can you see performance variations. Then you can control the exceptions.

HOW CONTROL LAG HURTS

Control varies in both degree and time. We may see little or lots of action. We may see corrections made promptly—or months later. Some variations in control can be traced to competition, to per cent of controllable cost, to profit margins, or to combinations of these. But also, and perhaps more significant, the cause is simply that some people manage better than others.

Turn the page

COST CONTROL . . . *Begins on page 62*

"We will have to learn to manage better because future speeds of production and marketing will enable us to go broke much faster." This is Phil Carroll's parting shot as he takes a look at . . .

What's Ahead in Cost Control

I LIKE TO BELIEVE that some part of our failure to control costs lies in lack of confidence in the figures. Even so, this does not relieve the manager of a very important responsibility I think is his—namely, to assure himself of adequate and accurate cost figures. Some managers seem to forget that accounting is a service function. Too many are "paying" for this service and not getting what they need.

My impression is that many managers do their most complete job of delegation in this phase. They appear to rely almost 100% on accountants to give them the figures they need. This is a mistake. Maybe they get lost in the maze of "reprorated reprorations." That's my term for the intricacies of applying overheads to indirect departments, cross-charging among them, and then getting the overheads applied to product.

My conviction is this: *Managers should know more about accounting than accountants.* This stems from the belief that managers should help to design the tools they need for control. But it does not include shuffling figures to conceal truths. Charging costs in wrong places only puts off the managerial actions necessary to remove their causes. The frequent request of estimators to "sharpen your pencil" is the same kind of mental dishonesty in another form.

HOW PROFITS GET LOST

We say costs today are too high. They are. But are we reaching that conclusion based on comparisons with costs as they should be? Or are we saying this because profits are down and continuing to decline? Profits may be low simply because we are selling too many sales dollars for 75¢. Some companies I have studied recently have had as much as 20% of their volumes in loss-making products.

One reason was given us in 1941 by G. Charter Harrison, the noted analytical accountant. He said, "The outstanding defect of the conventional profit-and-loss statement is that it . . . reports profits *made* but it does not show profits *lost*." As a result, too many managers are looking in the wrong places.

"Part of our failure to control our costs lies in a lack of confidence in the figures we get to work with."

Let's keep in mind that profit is a combination of three factors—price, volume, and cost. What we call "cost" goes up and down as volume varies. So does price, if we think in terms of booms and recessions.

For better cost control in the future, managers must take three steps:

STEP 1. GET THE FACTS

To unscramble successfully this price-volume-cost complexity, I suggest that the first thing we need to do is take our oft-repeated No. 1 step—"Get the facts."

Most of my efforts in cost control have been pointed in this direction. Hence my long-time quarrels with average overheads, indirect ratios, and unmeasured work.

You can't get the controls you need until you separate the facts from the figures.

My plea is to give managers the day-to-day indicators that tell whether they are on the main line or on some detour. Their job is to spend money to make money. This calls for decisions—many every day. These are made in many degrees that vary from all right to all wrong. This probability of human error cannot be eliminated. It can only be reduced.

"People spend money. Only people can save it. Systems can't. So managers will have to learn to manage better."

So our cost-control problem involves four major factors. Really, these are 2x2—two that cut lag and two that reduce errors:

To cut lag:

- Get reports showing trends of results submitted to you more promptly.
- Get faster actions by eliminating the roadblocks to profit improvement.

To reduce errors:

- Get better interpretations of facts so as to increase the number of better decisions.
- Get cost facts that more correctly reflect profits or losses by products.

To attain better cost control—and to satisfy the factors above—you must do three things in order:

1. Train managers to insist upon having sensitive and up-to-the-minute indicators they can use.
2. Teach accountants what managers need.
3. Combine viewpoints of managers and cost men.

No. 2 above is being approached. Some controllers have brought engineers and manufacturing men into their departments. These men have helped to translate figures into more understandable forms. But the basic problem still remains—that is, to get managers to be more analytical about the results that are being reported. Managers must learn to see through this complex of changing product mix and changing price-volume-cost relations. Only then can they prescribe the kinds of indicators they need to help them steer their courses more correctly.

STEP 2. BUILD COST INDICATORS

Managers cannot expect electronic data processing to solve these problems. High-speed computers will only give wrong answers faster to those managers who still have average overhead rates.

Managers need to set up a cost-collection system that gives meaningful indicators. To do so, they must:

- Sort out overheads—and I include selling cost—by the several products in the mix. Only then can managers distinguish between relatively low sales price and high cost at a given volume.
- Separate the cost variance that results from arithmetic. This is the change in overhead cost caused by changing volumes. This effect must be sorted out before a manager can tell whether sales effort or cost control is changing his cost.
- Measure indirect work. With successful incentives, cost control is attained after you determine how often indirect work is to be done. This "people" part of overhead will continue to rise. Remember, if some time in the far-off future we get to complete automation, everybody will be overhead.

STEP 3. ACT ON CONTROLS

As we move ahead we will create and improve our measures of manager performance. These will add to frustration or ulceration, as you prefer, unless they more correctly measure achievements.

The "executives" we are "developing" may think the measures of their performances are unfair just as their predecessors have thought. If this attitude brings on either lack of control (inaction) or shuffling of figures (concealment) all the reports are waste paper.

The basic fact to keep before us is that *control is action*—not accounting. This vital distinction was brought out by one manager. He had been needled by the cost man until he exploded, "I make the costs. All you do is write them down." Thus the attitudes of those who must control costs and look toward the measures behind them become more determining. People spend money. Only people can save it. Systems can't.

So managers will have to learn to manage better—and act more promptly—because future speeds of production and marketing will enable us to go broke very much faster. And they will have to make an increasingly higher per cent of correct decisions. For them to succeed, our price-volume-cost indicators must be made more sensitive to change.

"You can't get the controls you really need until you get the facts separated from the figures."

These restrictions on cost control will apply particularly to department managers. They will have to restrict waste to lower frequencies as margins narrow. Thus I foresee more use of "pay your way" measures for managers. We must move rapidly for three reasons:

First, this is a sound way to find out how well these future managers are developing.

Second, putting each manager in business for himself will help to shift from the prevalent "it's better to conform than perform" attitude to a vital interest in improving company success.

Third, this "pay your way" measure would help recreate the understanding of the American customer's free-choice way of life. It seems crucial to me that we provide some effective antidote to turn us away from the security-obsessed attitudes held by many middle managers. This becomes more necessary with each additional pension and seniority provision.

The real controllers of cost—those in direct charge of the people who do the work—must promptly take constructive actions on the spot. In their skills, actions, and follow-through lie our chances for successfully meeting competition from all over the world. So our continuing success as an industrial nation depends upon developing, measuring, and rewarding each manager in relation to his results.

How to Get Exactly What You Need

Planning a new control system? Want it to work right? And pay off? Then here's what you'll have to tell the men who'll build it for you.

THE WHOLE STORY. That's what a controls manufacturer has to know about that new system you're planning. Anything less and you're in for trouble. You'll get a system that shoves up your reject rate. Breaks down when you put new

28 Questions to Answer	Why You Must Answer Them
THE CONTROL JOB ITSELF	
1. Have you specified clearly every decision the system must make through every part of the cycle and under every combination of conditions?	Many systems fall short of expectations because nobody studied the problem fully in its planning stages. Study often shows that a system can be simplified.
2. Will (or should) the system interact with any other manual or automatic systems that are already built into the controlled equipment? Or may be built into it in the future?	This kind of doublecheck may reveal peculiarities or unsuspected potentials in a proposed system.
3. Will the controlled equipment operate dependably over the full range that's to be supervised by the system?	It's often easier to build wide range and precision into a control than into the machine that's controlled. No control can improve on equipment that's inaccurate or incapable of operating at extremes of pressure, speed, temperature, etc.
4. Will all other adjacent equipment involved in the integrated system operate dependably as above (3)?	Studying performance of related equipment often shows that changes need to be made to capitalize on the speed or accuracy provided by automatic controls.
5. Are you providing flexibility for change in dimensions, weights, colors, composition, value, or other characteristics of the product?	Unless they're provided for, even slight changes in the end product may make a control system useless.
CONTROL PERFORMANCE	
6. How much will total net loss per hour be if the system fails? How often can you afford this?	No failure-proof control system can be made. The more costly a failure is, the more thought you should give to plug-in components (or even entire controls). Ideal situation: plug-in spares in stock or on idle production equipment.
7. How quickly must a system failure be repaired? Will manpower be available at all times to make repairs?	As a rule it's not desirable to make major repairs on control equipment on the production floor. But that's where diagnosing should be done. The lower the skill needed for diagnosing, the better.
8. How much time is available for system warm-up? Is manpower available to provide warm-up?	Ultra-stable circuitry costs money. But it may be less costly than manpower to baby along control equipment that drifts during a long warm-up period.
9. Will replacement of parts during repair involve delays for adjustment or "wearing in"?	If you plan properly you can select designs that require only a simple adjustment—or none at all—when parts are substituted.

in Automatic Control Systems

demands on it. Won't lend itself to new processes or materials. Will never pay back your investment.

So, if you want to get what you really need in that new automatic control system, spell it out for your manufacturer. He can't read your mind, can't crystal-ball changes in product or process, can't know the things in your plant that might keep the system from working 100%. You've got to tell him.

To help you tell him what he ought to know about your problems, here are 28 key questions you should give him answers to—plus reasons why they are important to you and your new system. They reflect the wide experience of R. B. Sterns, chief engineer, Sterns Control Corporation, Great Neck, N. Y.

CONTROL PERFORMANCE (continued)

10. What time will be available for routine or preventive maintenance of the control system? Can routine testing and maintenance be done if the controlled equipment is down for maintenance?

Maintenance requirements must be compatible with process turn-around or available machine downtime. You'll need time if controlled equipment must be in service while the control system is being adjusted following maintenance. And if you want to speed production-floor checkout time, you must plan simple test procedures before the control system is built.

11. Will accessible circuit adjustments be designed so that improper dial settings can't damage the control system or the controlled equipment?

No control system does any more "thinking" than is built into it. Typical hazard: providing a speed range in the control system that's beyond safe machine speed.

12. Will faulty operation of the control system be immediately evident so corrective action can be taken?

Automatic controls need "dead man" protection, too, so they'll shut down machinery or warn the operator that the control isn't working. This is especially important with monitor-type controls.

13. Will a dangerous condition result from failure of the control system (or its power supply) at any point in the operating cycle?

Fail-safe functioning is a vital point to check on many types of control.

CONTROL ENVIRONMENT

14. Will the system have to cope with any atmospheric conditions that might shorten its life or cause some malfunction? For example: corrosive fumes; extreme dustiness; conductive, abrasive, or magnetic dusts; high humidity; airborne sprays (solvents, paints, cutting oils, water, insulating varnishes); splashed fluids; insects; extreme high or low air temperature; sudden temperature changes.

One or more of these problems exist in nearly every control location. Unless the control is built to withstand contaminants they can put a sensitive system out of commission. Plant people understand such atmospheric problems on a year-round basis better than any control designer. But it doesn't make sense to waste money on an over-protective design.

15. Will mechanical phenomena interfere with proper operation of the control system? For example, vibration, shock, bumping.

Without shock mounting, vibration or shock can cause faulty relay or contact operation, cut tube life, loosen mounted parts, cause failure. Often control should not be mounted on the machine controlled.

16. Is your plant electrical system suitable for the control system? For example, what is the range of power supply voltage? What is the frequency and severity of voltage dips and surges? Is grounding satisfactory? Is there any cross-feed through induction from adjacent power, control, or communication circuits?

It's better to feed controls from a separate stable line. Dips and surges may not show up on standard instruments but they can affect high-speed controls (e.g. electronic counters). Without solid, direct grounding, impulse-actuated controls (e.g., photocells) may respond to pulse-like surges in nearby conductors.

17. Will control adjustments be accessible to unauthorized or inadequately trained employees?

Accessible adjustments ought to be kept at minimum to prevent dial twiddlers from fouling up operations.

Turn the page

Begins on page 70

28 Questions to Answer	Why You Must Answer Them
CONTROL TESTING AND INSTALLATION	
18. Do you want the control-system manufacturer to test the system at his plant before you accept it?	Testing 100% costs more—but may be cheaper than one failure in service.
19. Should you specify simulated environment testing for the system at the control builder's plant?	Testing time at the builder's plant may be cheaper than machine time in your plant.
20. Who is responsible for installation and successful operation of the system? Is this clearly specified?	Clearly specified responsibility makes as much sense for controls as for machines.
21. Will you provide machine time and product for a thorough test of the system?	Pretesting by the manufacturer may be more economical if production downtime is critical. Checkout time ought to be held at minimum.
CONTROL MAINTENANCE	
22. Do you have personnel and equipment to handle routine maintenance and breakdown of the control system?	Probability of failure has to be studied—and provided for. If the cost of failure is high, it may be less costly to build more reliability into the system.
23. Will the system components operate at realistic values for industrial service and according to manufacturer's recommendations?	Industrial circuitry can't accept short cuts or "economy" components. Tubes (especially thyratrons) must not be loaded until cathodes reach operating temperature. Many components must be de-rated substantially. High-reliability tubes cost more, but are more trouble-free. Semiconductors are far freer from trouble if temperatures are well below the recommendations of the manufacturer.
24. Will lubrication be kept at a minimum?	The less lubrication needed, the better. Oil picks up dust. Plastics that need no lubrication (e.g., nylon, teflon) may be better for gearing.
25. How quick—and easy—do you want your troubleshooting to be?	Troubleshooting circuits can be built into the control system. A few pilot lights, press-to-read meters, and interstage contact points can shorten time spent on troubleshooting from hours to minutes.
26. Will plug-in components be necessary?	Sectionalized design (plug-ins and subassemblies) costs more. But it slashes repair time.
27. What spare parts must be kept in stock?	Your own experience and the manufacturer's should answer this. Factors to consider: distance from source, need for round-the-clock performance, cost of components, likelihood of deterioration in storage.
28. Will you need service instructions, circuit diagrams, and maintenance staff training?	The manufacturer's salesmen and your own maintenance staff may be changed before the first trouble arises. So all data ought to be on hand. In spite of guarantees, relying on the manufacturer for minor repairs and adjustments is a waste of his time and yours.

FREE FILE COPY of this article available while supply lasts. Circle FC-28 on Reader Service Card next to back cover. For complete FC list, see page 226.

Why Better Lighting Is a "Must"

A "must" right now, too. It's an easy way to boost profits, output, quality, morale. And today's developments give you four reasons to speed the job.

THE HANDWRITING is on the wall. And if your plant lighting is good enough to see by, you should be able to read the message. The message: "Your good-enough lighting just isn't good enough any more." There's scientific proof that today's lighting lags 20 years behind today's standards.

Everybody knows that first-rate lighting in a supermarket or a bank has a good effect on people. Same is true of industrial lighting. But industrial lighting today is less than half as good as it should be (FACTORY, August 1958, page 63). The cost of half-way lighting:

- Rejects are more common.
- Accidents happen oftener.
- Profits are lower.

Lots of plants duck decisions on modernizing their lighting. The result is a haphazard approach. Employee complaints—if they're loud and long enough—sometimes can pry loose a few dollars for new lighting. And out of fear that the plant may look as antique as it is, management may modernize plant lighting. But this finger-in-the-dike treatment of lighting needs is bound to change. Why? Four reasons:

1. NEEDS ARE KNOWN

We now know about how much light we need. Tests at the University of Michigan's Vision Research Laboratories show that the eye needs a certain light level to perform certain seeing tasks (FACTORY, October 1958, page 102). The new standards of the Illuminating Engineering Society, which call for double the old standards, aim at providing the proper levels.

Economic realities force these new standards to compromise with ideal lighting. But if lighting economics change substantially, standards may have to be raised. The old complaint that you can't keep up with standards because the engineers keep raising them is likely to be heard less and less.

2. EQUIPMENT IS READY

You can get lighting equipment to match the new standards. Satisfactory high-intensity light sources are now available—like color-improved mercury and high-output fluorescent lamps, both of which have high output per unit, are easy to install. Many manufacturers list properly designed fixtures for these lamps and offer installation data.

3. PAYOFF IS SURE

Over-100-foot-candle lighting is paying off. Plant management is finding that it pays off even better than improvements made during the 1940's, when fluorescents were introduced. The payoff goes 'way beyond better employee morale.

4. COST RATIO IS GOOD

Today's ratio between lighting and labor cost favors investment in lighting. The 20-year gap between average plant lighting levels and lighting standards is bound to close.

With production labor costs continuing to rise, industry must make every effort to improve worker efficiency. More output per hour comes from more workers with high skills. Long before scientific studies of lighting were made, industry knew that skilled workers need more light than unskilled. That's why draftsment, toolmakers, layout men, inspectors, finishers, engravers, and precision assemblers traditionally get the benches by the windows (or the newest and brightest lights). Their jobs involve difficult visual decisions, and they need lots of light to make those decisions at top speed.

Fortunately, lighting is one vital supplement to labor that's less expensive today than ever. Maybe you are paying your skilled workers twice the hourly rate you paid them 10 years ago. But you can now buy foot-candles for less than you had to pay 10 years ago. That's because power, equipment, and maintenance cost per foot-candle-hour totals less today than in 1949.

ADDING UP YOUR NEEDS

Some plant management men think of lighting mostly as an accounting item. Why? Because it's usually shown as a part of overhead.

If you look at it this way, it's easy to conclude that any plant lighting system is good enough because "We've got to keep overhead down." And if business is good, your lighting (you might think) is probably good, too.

This is the subtle trap many plant management men fall into. But accounting data just can't determine the proper lighting levels. Lighting is a production tool, just like any other labor-saving equipment. It deserves the same kind of review and obsolescence audit that you give to any other production equipment. You should take the attitude that lighting must pay its own way—and show a profit, too.

How can you get out of this good-profits-mean-good-lighting trap? One way is to visit (and have your top management visit) a well-lighted plant. You'll see why it's easier to work in a properly lighted shop or office. You'll note that good housekeeping follows good lighting—dirt is so embarrassingly obvious. And you'll see how safety records and morale have improved.

Another way to appreciate good lighting is to study the examples on the next two pages. All of them are designed to pay returns in increased productivity, better morale, more safety, and less waste.

Turn the page

By J. L. TUGMAN and DON R. PHILLIPS, Large Lamp Department General Electric Company, Cleveland

YOUR PLANT LIGHTING QUIZ

If your answer to any of these questions is "Yes," it's time for you to re-check your plant lighting levels.

		YES	NO
1.	Do you require above-average employee competence or skills?	☐	☐
2.	Is your number of employees per unit of floor area higher than the industry average?	☐	☐
3.	Is your lighting causing employee discomfort, complaints, absenteeism, or low morale?	☐	☐
4.	Is your product reject rate above industry averages?	☐	☐
5.	Will your product be used or displayed under better light than you now use to inspect it?	☐	☐
6.	Is your plant so dusky that workers can loaf, pilfer, sleep, sabotage on the job?	☐	☐
7.	Any chance that your plant is below standard on housekeeping or sanitation?	☐	☐
8.	Is your accident rate high for no apparent reason?	☐	☐
9.	Are production areas near windows considered premium territory by the workers?	☐	☐
10.	Do production areas with daylight perform better than those with plant lighting?	☐	☐
11.	Have managers of plants similar to yours found that better lighting pays off for them?	☐	☐
12.	Are competition's lighting levels higher than yours?	☐	☐
13.	Do eye troubles in your plant exceed industry averages?	☐	☐
14.	Are costs of cleaning hard-to-maintain fixtures too high?	☐	☐
15.	Is your proportion of older workers higher than average?	☐	☐
16.	Is investment per worker above your industry's average?	☐	☐
17.	Have you taken foot-candle readings in the last two years?	☐	☐

What Better Lighting

(Cost estimate basis: power, 1¢ per

Activity: High-precision machining.
Plant: Erickson Tool Company, Solon, Ohio.
Equipment: 8-ft. high-output fluorescent lamps directing 25% of light upward; 35-deg. cross-shielding.
Foot-candles: 180 (250 maximum).
Cost: 0.7¢ per foot-candle-hour per 10,000 square feet.
Benefits: Rejects down 20%, efficiency up 10%.

Activity: Turbine component subassembly and machining.
Plant: General Electric Company, Lynn, Mass.
Equipment: 1000-watt mercury vapor lamps in luminaires with 12½x15-ft. spacing, mounted 30 feet above floor.
Foot-candles: 110 (160 maximum).
Cost: 1.2¢ per foot-candle-hour per 10,000 square feet.
Benefits: Less supplementary lighting; good high-bay lighting.

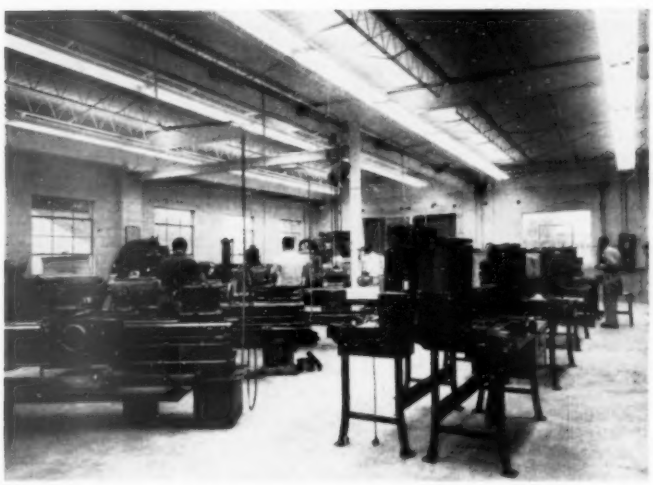
Will Do for You—and What It Will Cost

kilowatt-hour; equipment amortization, 10 years; average lamp life and price)

Activity: Precision toolroom machining operation.
Plant: Snap-Tite Company, Union City, Pa.
Equipment: 8-ft. T-12 lamps, directing 25% of light upward; 11 feet above floor, 11 feet between rows.
Foot-candles: 120.
Cost: 0.8¢ per foot-candle-hour per 10,000 square feet.
Benefits: Adequate lighting, no glare.

Activity: Tool designing.
Plant: Erickson Tool Company, Solon, Ohio.
Equipment: 8-ft. high-output fluorescent lamps directing 25% of light upward; 35-deg. cross-shielding.
Foot-candles: 250.
Cost: 1¢ per foot-candle-hour per 10,000 square feet.
Benefits: Reduced eyestrain, fewer mistakes, better drafting.

Activity: Precision machining.
Plant: Kirby Machine Shop, Noblesville, Ind.
Equipment: Two-lamp Power Groove luminaires with 25% upward lighting mounted 14 feet above the floor.
Foot-candles: 150.
Cost: 0.8¢ per foot-candle-hour per 10,000 square feet.
Benefits: Improved product quality, employee morale.



Activity: Delicate bench assembly.
Plant: Douglas Aircraft Company, Los Angeles.
Equipment: Ceiling-mounted 8-ft. unshielded slimlines, 15-ft. centers. High-output lamps, 35-deg. shielding, 7 feet high.
Foot-candles: 450.
Cost: 0.8¢ per foot-candle-hour per 10,000 square feet.
Benefits: Rejects cut 90% for a saving of $2800 per day.

Yes, You Can Tell Whether

Is your program a boon or a boondoggle? Here's the help you need to uncover those hidden costs, come to grips with the facts, see where you stand.

SOME TIME this month a committee of well-paid managers in your plant will meet. They will decide on awards for ideas submitted in your company's suggestion program. Will the cost of their time be charged against the savings produced by the suggestions accepted?

Probably not. Because if your plant is like most, you do three things wrong:

- You underestimate the costs.
- You underestimate the savings.
- You don't give the program a long, hard look.

GETTING THE COST FACTS

What are the real costs of suggestion programs? There are at least six of them:

1. The award itself.
2. Maintenance of the suggestion-plan staff and provision of its accommodations and materials.
3. Committee time.
4. Time spent in ceremonies to present awards.
5. Time spent by the operating officials in evaluating the suggestions —and in reporting and defending their evaluations.
6. Time spent on the job by the employee in developing the idea.

The first four of these cost items are clearly chargeable to suggestion program costs. You can measure them easily. The last two items are intangible and hard to measure. But they are probably the largest two single-cost items.

Should you charge either of these two items as a cost of the system? Yes, you should.

Best argument for charging every possible cost against the program: You get a conservative net savings figure that will satisfy the most hard-boiled comptroller.

Cost of evaluating—How do you determine the cost of time spent by operating officials in evaluating ideas? Three sampling surveys may give you the answer. The findings aren't exact. For one thing, it's hard to determine what time to count and what not to count. But some facts are better than none, once you admit the possibility of error.

Two studies of time spent in evaluating suggestions have been made in the Department of the Navy. In one large shipyard a survey showed an average cost of $37 per suggestion processed. An independent estimate, made in another large Navy organization—without prior knowledge of the shipyard survey—showed $32 per idea processed.

A similar analysis made by the assistant comptroller of Socony-Mobil Oil Company in 1953 was reported to the New York-Philadelphia regional meeting of the National Association of Suggestion Systems in May 1954. This company found that the cost per suggestion was $50—made up of $34 variable cost plus $16 fixed administrative overhead. The analysis showed that the suggestion program in Socony-Mobil was turning a handsome profit.

Here's how the costs were broken down in the second Navy study and in the Socony-Mobil analysis:

	Socony-Mobil	Navy
Awards (average per suggestion submitted)	$ 6.00	$ 2.31
Committee meeting time	5.00	5.00
Administrative overhead, including program staff	19.00	18.60
Operating department investigation time	16.00	6.00
Sub-total, above items	$46.00	$31.91
Installation	4.00	Not calculated
GRAND TOTAL	$50.00	

Cost of job time—Cost of job time spent by employees in developing suggestions has never been measured or surveyed. Because there are no data available, you can charge as you choose. But you should at least recognize that these costs exist—and that they could tip the scales to the red side if the net savings computed from your suggestion plan are on the low side the way you're figuring them right now.

FIGURING THE SAVINGS

Most companies figure only first-year savings. The assumption is that most new ideas will be in effect at least one year. Beyond that, events are a matter of chance and cannot be influenced by the employee.

Using first-year savings limits the amount of the award. And, under the first-year system, there's no need to follow up ideas to see how long they remain in effect. This saves time, cuts costs. But the fact is that a year is an arbitrary and often misleading time period to use as a basis for estimating savings.

What basis should you use to estimate savings? One possibility would be to follow up on each suggestion idea to determine its life. Another possibility is to study a representative sample of suggestions, then arrive at some average life span for suggestions. The sample average gives management a better basis for evaluating suggestions and computing savings for the program.

Several organizations have attempted a follow-up on the life of all ideas. But some have abandoned this as an administrative burden. A sampling technique does an adequate job without undue cost. In 1954 Socony-Mobil Oil Company (then Socony-Vacuum) reported that a conservative estimate of the life of a suggestion in the company was three years. This figure was determined after a random-sample survey.

Intangible savings—In most suggestion systems the ideas adopted on the basis of indirect or intangible savings far outnumber those to which tangible dollar savings can be assigned. The assistant comptroller of Socony-Mobil, after analyzing a group of suggestions with intangible benefits, concluded that $50 was a

By C. E. AUVIL and W. J. CASSELL
Departmental Civilian Personnel Division
Department of the Navy, Washington.

Your Suggestion Plan Pays Off

reasonable average. This figure has the political virtue of equaling the calculated average cost of processing each suggestion.

Setting the average dollar value of suggestions with intangible savings at the same figure as the average processing cost appears to be conservative. It also provides the automatic break-even result on each such suggestion. And some saving or loss figure must be assigned to intangible suggestions before net income (or loss) on the program can be properly calculated.

TAKING A HARD LOOK

Savings from suggestion programs are reported as though the savings resulted from the program. But the report really shows the savings that result from suggestions processed under the program.

Some employee ideas will be adopted irrespective of whether the company has a formal suggestion system. These ideas and the resultant savings (net or gross) cannot be claimed to result from the program.

Here's an example: An employee in Company A has an idea about how to improve a procedure. The company has no suggestion system. But the employee tells his boss, the idea is adopted, and the company benefits from the saving. The employee may or may not be rewarded by a favorable assignment or promotion. An employee in Company B has a similar idea. Company B has a suggestion system. The employee submits his idea and it is adopted. The suggestion program administrator reports that a saving results from the program. Does it? Maybe so. But maybe not. Maybe the employee in Company B would have had the idea and the company would have benefited from it even if the company had had no suggestion system.

On the other hand, most suggestion systems can be assumed to provoke more ideas from employees than if there were no suggestion system. This increase, results from program publicity and the offer of awards. And most suggestion programs insure more careful consideration of ideas by management.

LIMITING THE SCOPE

Assuming that some savings do result from the suggestion program, and that others would be realized even without a program, can we tell which are which?

First, some ideas might well come to light and be given appropriate management consideration even without a suggestion system. Such ideas fall into two main types:

1. Ideas that are attractive enough in themselves to obtain consideration because of novelty, timeliness, or potential savings.

2. Ideas that come from a source management cannot well ignore, such as persistent employees, union officials, foremen, professional personnel, or other members of management. Most of these sources have enough status or protection to risk the possibility of resentment or reprisal for suggesting a change in something somebody else is doing.

The means for such rough analysis is this: Omit the savings from suggestions above a certain dollar size and from those from personnel above a certain status. These cutoff points must be determined for each organization. Many companies already exclude management, supervisory, and professional or office personnel from suggestion systems. If your program data show a group of suggestions with savings far above the average, you can rule these out. Or you can cut off and rule out the two standard deviations.

FINDING YOUR NET GAIN

Here's how to make a conservative report on your program:

- Take total first-year savings.
- Subtract installation costs.
- Subtract savings credited to suggestions that are above the predetermined size of award or savings or are from excluded personnel.
- Add an amount for each adopted suggestion with intangible benefits.
- Multiply the result by estimated average suggestion life.
- Subtract the following costs:

1. Awards made.
2. Other administrative costs (program staff, committee time).
3. Estimate of review time spent by operating officials.
4. Estimate of on-the-job time spent by employees in preparing and submitting suggestions.

This calculation method omits certain suggestions from the savings calculation but includes them in the cost calculation. This way, the analysis is even more conservative. But if results will be seriously distorted by including the award and other costs for these suggestions, such costs could be omitted.

Most programs should show a profit even under these procedures. And such reports should impress comptrollers—even cost accountants.

One company's figures—Using data similar to those discussed, Socony-Mobil made a payout analysis of its system. The following factors were used:

Cost per suggestion received	$50
Average value of suggestions with intangible benefits	$50
Average estimated life of each adopted suggestion idea	3 years
Suggestions adopted	30%
Suggestions with tangible savings	4%
Average tangible and intangible savings per suggestion received	$75

The initial capital outlay was estimated at 1½ times the first year's expenses. Using these data Socony-Mobil estimated that the original capital outlay had been repaid at the end of five years and that the system had provided its own working capital. Then, estimating a 20-year life for the suggestion program, the company calculated that its program would earn an 800% return.

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How do you improve methods? Chances are you use traditional approaches. Now—here's a brand-new way of looking for methods improvements. It probes for cost cuts where the cost-makers are—and wins big savings from simple changes. For this company it brings in . . .

$500,000 From Better Methods

OPERATIONS ANALYSIS is piling up savings at a $500,000-a-year clip here at Carrier Corporation. In areas where we've put our system to work cost reductions have averaged 25%. Over-all economies are in the order of 15 to 20 times the cost of running our Operations Analysis (O.A.) department.

What's O.A.?

It's a new, broader kind of methods improvement. We're using it in our Machinery and Systems Division. The men who run it report to divisional general management, take on any job anywhere in the division. But they avoid direct labor operations—on which there's already plenty of emphasis and study.

HOW O.A. WORKS

O.A. is people-oriented—not methods- or equipment-oriented. Why? Because people are where the waste is. And they're where the best ideas for improvement come from.

By STANLEY CARTIN, Manager
Operations Analysis
Carrier Corporation, Syracuse, N. Y.

Jobs get on the O.A. department's schedule any of three ways:

1. Managers of operating departments request the service.
2. General division management asks for an analysis.
3. O.A. men suggest study of a function based on what they've learned by studying functions in related departments.

Every year a schedule of analysis is developed, then approved by management. The schedule is flexible, because any single analysis might uncover a logical next step that nobody anticipates.

Carrier's O.A. department has just four analysts. They're carefully chosen from within the organization. Their chief traits: broad background, analytical mind, a solid reputation for successful relationships with people. All four analysts have stature in the organization—brought it with them from the previous jobs with Carrier.

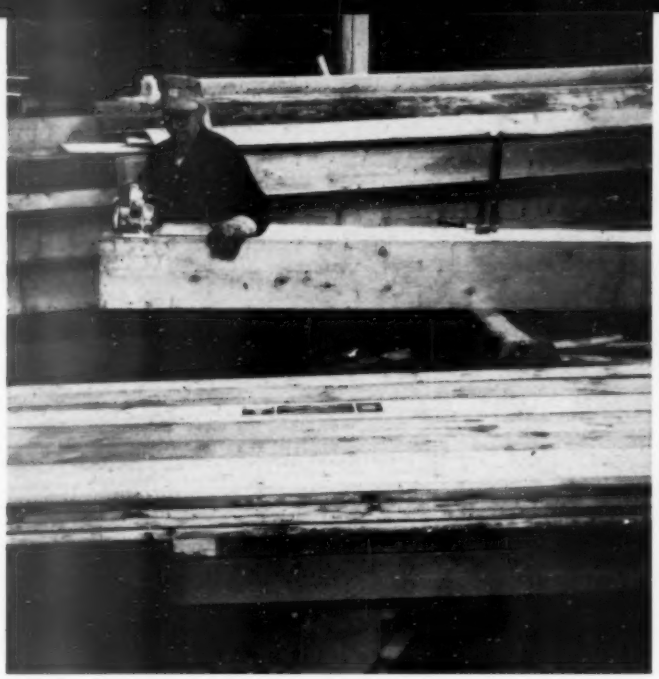
Analyses are broad, comprehensive. For example, an analysis doesn't study scrap disposal at a specific machine. It deals instead with all plant cleaning, scrap collection, disposal. One analysis like this took three months, produced savings of $115,000 per year.

The methods aren't unusual. The analyst uses the mathematical techniques of operations research—without getting too sophisticated. That's because his chief source of information and ideas is the people who work in the function. He can't do his job unless operating managers and workers cooperate.

Recommendations are developed in close cooperation with operating supervisors. Line supervisors approve final proposals before they go up to general management. And line supervisors put the approved changes into effect. O.A. men make six-month follow-up reports on how the changes are working out.

O.A. is 2½ years old at Carrier. It started with studies of non-productive work in the shop. Now the offices, too, are getting attention. Generally speaking, work elimination has been a bigger source of savings than work change.

The following pages will show you how O.A. has wrought changes and produced savings at Carrier.



$115,000 from improved scrap management

Scrap lumber saved—Carrier buys lots of tubing for air conditioners. Shipping boxes used to clutter up the place before being scrapped. But O.A. changed that. Now box ends—where most nails are—are cut off with a power saw (left photo), other nails are pulled, and remaining lumber is used in shipping. Value of reclaimed lumber is about half the cost of new box wood. Savings from reclamation of scrap lumber: $14,000 a year.

Metal scrap segregated—Scrap from a single slitter used to be shoveled into pans, hauled out as mixed (black and galvanized) scrap. But black scrap is worth $6 a ton more than galvanized scrap. So Carrier decided to install one conveyor and build another right in the shop. Total cost for both conveyors: $500. Savings accumulated from less scrap and better scrap prices (right photo): $13,000 a year.

Premium melt set up—Burners of heavy steel plate have now been trained to make all scrap into premium melt (i.e., uncontaminated and in small pieces). They cut long pieces into small with a hand burner during idle time—could have done so formerly had they known that piece-size determined value. Premium melt adds $6 a ton to scrap value. A scrap dealer helped O.A. men make the analysis. Savings: substantial.

Cleaning crews merged—Two separate crews used to clean for rubbish and scrap. Janitors cleaned floors, left scrap. Scrap handlers picked up scrap, left rubbish. O.A. combined both jobs at the higher rate, cut manpower 60%. Savings: $63,440 a year.

Aluminum and copper separated—A way of separating aluminum ribbon from copper tubing (on which ribbon had been spiral-wound) was devised. Aim: better salvage prices for both metals. Savings: gratifying.

15% on office space

As Carrier grew, office areas were assigned without plan. Manufacturing engineering, production control, and production and maintenance supervisors were scattered all over. Even administrative and financial managers had offices in the plant.

O.A. played a big hand in rearrangement. Today like groups of specialists and managers are close together—and close to their work. But communications, paperwork flow, efficiency are improved. Cost of rearrangement (needed anyhow): about $60,000.

Storage space converted—The handsome, convenient maintenance office in the photo is a converted storage hole for crane parts. It's in the middle of the plant, yet close to other plant offices. Occupants are pleased. Cost: $3200.

Turn the page

Begins on page 78

$143,000 from smarter use of overhead cranes

O.A. men studied operation and maintenance of 23 cab-controlled overhead cranes in the large machinery and stamping plant. Recommendations fell into four broad groups: better but less use of cranes, better use of jib cranes and power trucks, better housekeeping in aisles, and enlargement of the crane hitcher's job to include departmental materials handling in idle time.

Here are two cases:

Layout change—Simple relayout of fabricating and services department (top photo) eliminated two full-time cranes. Work used to zig-zag across aisles, so jib cranes couldn't handle moves. Now aisle jumping is almost eliminated. Savings: $20,000 a year.

Ground rules set up—Congestion and force of habit led crane men to drop loads at fringe of machining area—out of range of jib cranes. O.A. spurred supervisors to establish ground rules and handling procedures. Now (lower photo) operators with jib cranes do all in-department handling. Only cost: training. Savings: $20,000 on overhead crane costs, plus a 12% boost in production because there's no time lost waiting for overhead cranes.

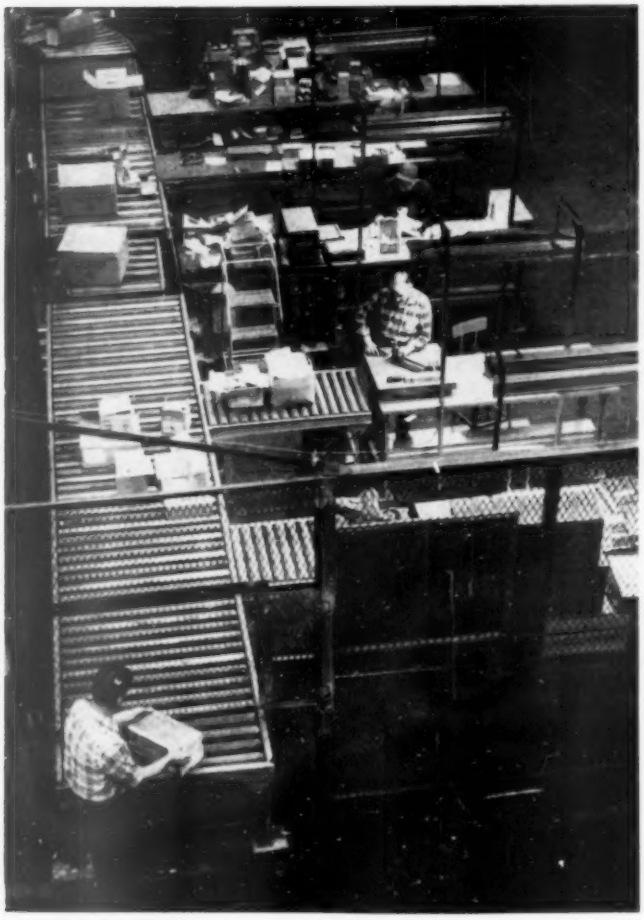
$35,000 from tools and cribs

Abrasive disks saved—One Carrier operation wreaks havoc with the outside inch of 9-in. abrasive disks. Stores man in the photo (right) is cutting off that battered edge, making 7-in. disks for other operations. He will place the smaller disks in stores.

Record-keeping changed—O.A. cut the cost of tool-record tabulating by developing a hand method that challenged the cost of machine tabulation. Tabulating department changed procedure, simplified the work, put tool inventory on less costly machines, cut costs enough to meet the cost of hand tabulation. Savings: $5000 a year.

Cribs rearranged—Cribs have been consolidated, set up differently. In one seven-story building first- and third-floor cribs and an in-plant paint crib were merged into one master crib on the second floor, close to stairway and elevator. Outside paint stockroom remains outside but all service is provided by one man who does other work in the main crib. Total cost of rearrangement: $1500.

Duties consolidated—Ordering, supervising, and expediting duties have been centralized in the main Carrier plant, whereas each of two plants used to have its own set-up. Annual savings: $30,000, mostly in lower personnel costs.

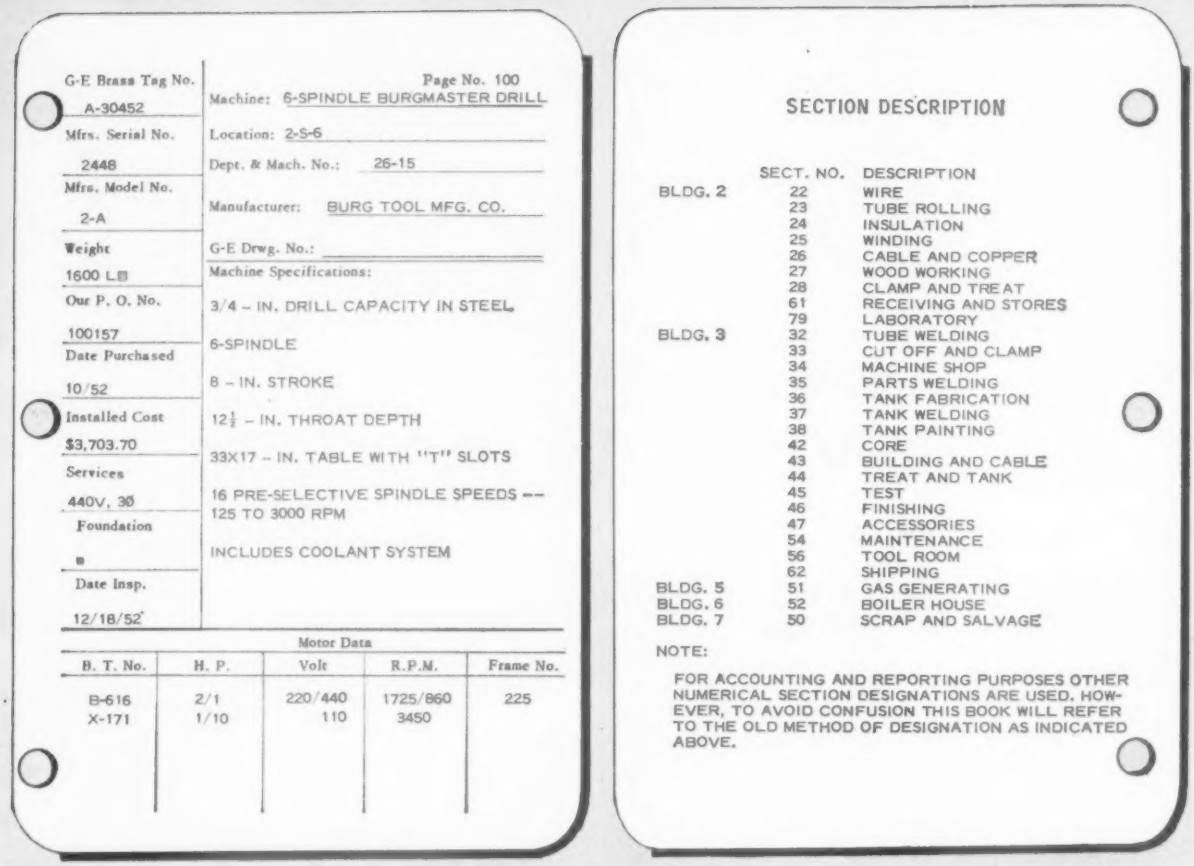


$53,000 from other ideas

Receiving-inspection updated—New benches and conveyors (left) cut handling problems in inspection. Cost of benches and conveyors (using some already-installed equipment): $800. Annual savings: $16,000.

Aisles newly marked—No more need to paint them. They're permanently marked by special yellow fiber tiles. Color goes clear through tiles, never wears off. Tiles are set on 4- to 6-ft. centers. Section of wood-block is routed out, tiles are set in with glue. Cost of tiles: $2700 installed. Savings in the cost of painting: $3300 a year.

Blueprints controlled—O.A. study of blueprints showed shop personnel were the biggest users. Reason: everybody else in the operation, including people from purchasing and engineering, got prints from the shop crib supply. Then, when a shop man wanted a print, he'd have to get a new one. Now prints are controlled. Shop gets five copies, exchanges obsolete prints for new issues. Savings: $31,000 a year. Bonus benefit: Only current prints are now in the shop.



G-E Brass Tag No.	A-30452
Mfrs. Serial No.	2448
Mfrs. Model No.	2-A
Weight	1600 LB
Our P. O. No.	100157
Date Purchased	10/52
Installed Cost	$3,703.70
Services	440V, 3Ø
Foundation	■
Date Insp.	12/18/52

Page No. 100
Machine: 6-SPINDLE BURGMASTER DRILL
Location: 2-S-6
Dept. & Mach. No.: 26-15
Manufacturer: BURG TOOL MFG. CO.
G-E Drwg. No.:
Machine Specifications:
3/4 – IN. DRILL CAPACITY IN STEEL
6-SPINDLE
8 – IN. STROKE
12½ – IN. THROAT DEPTH
33X17 – IN. TABLE WITH "T" SLOTS
16 PRE-SELECTIVE SPINDLE SPEEDS — 125 TO 3000 RPM
INCLUDES COOLANT SYSTEM

Motor Data

B. T. No.	H. P.	Volt	R.P.M.	Frame No.
B-616	2/1	220/440	1725/860	225
X-171	1/10	110	3450	

SECTION DESCRIPTION

	SECT. NO.	DESCRIPTION
BLDG. 2	22	WIRE
	23	TUBE ROLLING
	24	INSULATION
	25	WINDING
	26	CABLE AND COPPER
	27	WOOD WORKING
	28	CLAMP AND TREAT
	61	RECEIVING AND STORES
	79	LABORATORY
BLDG. 3	32	TUBE WELDING
	33	CUT OFF AND CLAMP
	34	MACHINE SHOP
	35	PARTS WELDING
	36	TANK FABRICATION
	37	TANK WELDING
	38	TANK PAINTING
	42	CORE
	43	BUILDING AND CABLE
	44	TREAT AND TANK
	45	TEST
	46	FINISHING
	47	ACCESSORIES
	54	MAINTENANCE
	56	TOOL ROOM
	62	SHIPPING
BLDG. 5	51	GAS GENERATING
BLDG. 6	52	BOILER HOUSE
BLDG. 7	50	SCRAP AND SALVAGE

NOTE:

FOR ACCOUNTING AND REPORTING PURPOSES OTHER NUMERICAL SECTION DESIGNATIONS ARE USED. HOWEVER, TO AVOID CONFUSION THIS BOOK WILL REFER TO THE OLD METHOD OF DESIGNATION AS INDICATED ABOVE.

Loose leaves in vestpocket book are a sure guide for . . .

Finding Plant Facts Faster

You'll get quick answers to many a production and maintenance problem in your plant with this little black book. It knows all—tells all in a flash.

WANT the quick facts on a six-spindle drill you've got in your plant? Here at General Electric Company (Rome, Ga.) we have our own fact-tellers—little black books (sample pages above) that give us thumbnail specifications of about 450 types of major production equipment (above, left). They give us other facts fast, too—such as location of various activities and services in our buildings (right).

Worth while? We think so here at Rome. There's nothing like facts at your fingertips when you face urgent problems, have to make the right decisions—fast. Here are samples of how we put our little black books to work when we need facts:

. . . *Management weighs purchase of a new machine.* A key question: Where do we put it? Ordinarily we

By L. HERBERT CLARK, Manager
Manufacturing Facilities & Engineering
Medium Transformer Department
General Electric Company, Rome, Ga.

would have to postpone our decision until we could gather all the facts. But with our handy vestpocket manual we are able to sketch out the details then and there—arrive at a decision without delay.

. . . *Production faces an unexpected bottleneck in one area of the plant.* What can we do? We have to beg, borrow, or steal an extra machine from somewhere in one of our buildings. Our manufacturing people flip the pages of the little manual, quickly pinpoint a machine in another area that will fill the bill.

Lots of uses—There are dozens of other uses that hinge on some detail of information that takes time to get—time we often don't have. For instance, the manual constantly helps people who plan layout. It solves lifting and materials-handling problems by listing our cranes and their capacities. It tells our plant and manufacturing engineers what electrical, mechanical, and other services a machine requires. It's useful to our people who design tools and equipment. It helps in appraising possible changes by revealing such facts as pressures, throat distances, clearances.

Our little book is no substitute for the big maintenance equipment record that we (like other plants) keep in a central file. In contrast to the many details on machine specifications, spare parts data, and machine operating data of that big record, this manual just gives bare-bone data. It's intended only as a ready reference for more comprehensive discussion of operating problems by management people.

Who gets it—Distribution is made to the general manager, all manufacturing and engineering managers, all plant and manufacturing engineers, the methods and planning supervisor, and all tool and equipment designers.

MAKING THE BOOK

Our book is three-ring, loose-leaf, pocket-size, with several hundred standard 4½-x7-in. sheets. Make-up is designed for quick, easy reference. A single title page and a two-page preface are followed by these three indexes:

1. Section layout—This is a double-fold page giving a scale layout of the plant and grounds. It's a key to the location of all equipment described in the manual. The layout shows the main building number (encircled) and all section (or building subdivision) numbers. Significantly, all building columns and exterior and interior firewalls are shown. An alphabetical and numerical legend along the length and over the area of the plant helps spot the machine location. We'll see how later in this article:

2. Section description—This is a one-page index (facing page, right) to supplement the section layout. In three parallel vertical columns it lists building number, section number, and section description. Thus anyone who might want to know the type of operations that are located, say, in Section 22, would find the description "Wire." In reverse, anyone wanting to locate the wire department would find the "Section 22" cross-reference.

3. Machine index—Purpose is to give the page number that describes any specific machine. Machines are listed alphabetically by general name. For example, if you want to look up a steam platen press, you first refer to "Press," then run down the listing of various presses to "Press—Steam Platen." Opposite this you find your page number. This index runs seven pages. It's a necessary index because contents pages are grouped by sections. A tabbed divider marked with section number separates each section.

LISTING THE GOODS

Each machine gets one full page (see sample form for six-spindle, Burgmaster drill). The only exception to this rule is for a group of identical machines or units. Here one page is used for basic physical specs, a second page for location and other non-uniform data. Take our 28,300-amp., a-c welders, for example. They are described as a group on page 413, and individual locations are listed on page 414.

What equipment do we include in this manual? Here's what we tell the manual owner in the preface: "This includes machines that are most important to the manufacturing process. Certain items such as jib cranes, pumps, and testing equipment are omitted. Information as to location of these may be found in 'Maintenance and Construction Machine and Equipment List' books."

Most entries are self-explanatory. But a few need some interpretation:

. . . *Foundation.* We have classified all foundations as follows:

A—Machine is secured on bench.

B—Machine rests on wood blocks, is secured with U or J bolts or similar fasteners.

C—Concrete under machine supports.

D—Concrete under machine supports; pits for motors, conduits, etc.

Portable—Sometimes a machine (e.g., a welder) is marked this way.

. . . *Date inspected.* This is the date the machine was turned over to manufacturing, after a sign-off procedure including a safety check.

. . . *Location.* A note on "Section Layout" defines the code number shown here. First digit is building number. Middle letter is north-south column (ordinate) and last digit is east-west column (abscissa).

. . . *Department and machine numbers.* These are accounting charge numbers for work on that machine.

Pages are numbered consecutively. To keep down volume, we use both sides. Pages are arranged numerically within the sectional tabs, then in order of machine numbers.

ADDING PAGES

What about additions or revisions in our manual? They're no trouble. We give the revised page the same number as the original (as explained in our preface), then follow it with a dash and a revision number. For example, if the original page is 227, the first revision will be 227-1. When a new machine is added to our plant equipment the new page is inserted in the customary order of department and machine number. Its number is the same as that of the preceding page, but it is followed by a dash and a letter. For example, if preceding page is 401, new page will be 401-A.

Compiling the manual (once the format was set) was not difficult. We assigned a manufacturing trainee and an apprentice student from our advance manufacturing engineering unit to collaborate with maintenance and plant engineering personnel. They cross-checked the file with the equipment, pulled the data together. This assignment gave the trainee and apprentice experience with the characteristics of our manufacturing equipment, which is a definite part of their training program.

MANAGED MODERNIZATION At Work

One man with a head full of smart ideas has modernized Besly-Welles' plant housekeeping by organizing himself right out of the picture. It's . . .

Clean-plant formula: Map the areas . .

Easy-Way Plant Housekeeping

TEN MINUTES a day is all it takes to supervise housekeeping at Besly-Welles Corporation's South Beloit (Ill.) plant. It's another example of managed modernization at work. The plant is clean every day by noon. So clean that any maintenance man would envy the 150,000 square feet of spotless corridors, production areas, offices.

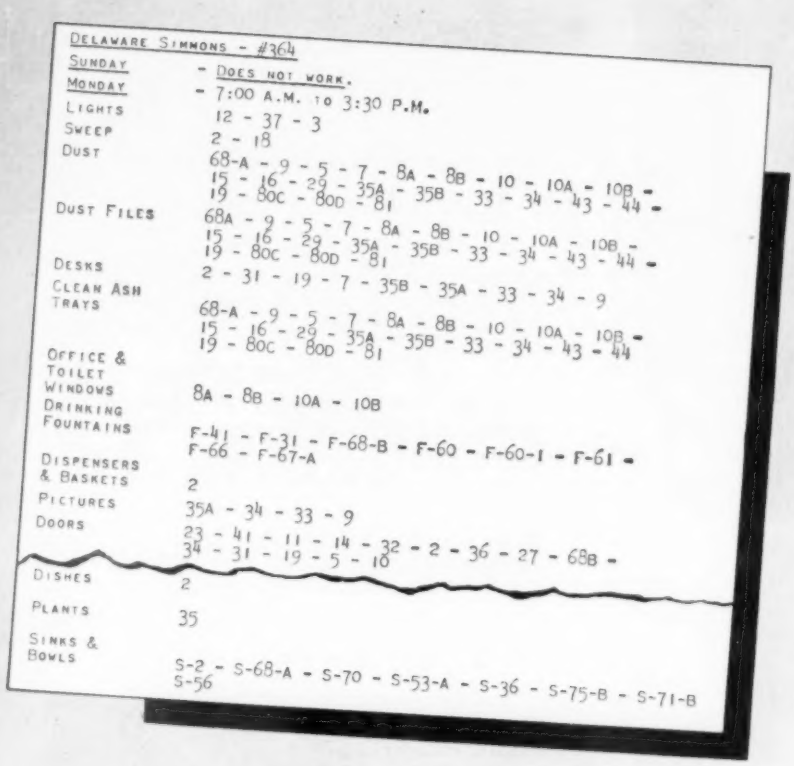
Reasons for the clockwork housekeeping? Three (photos and captions above). First there's an over-all plant layout chart that Maintenance Supervisor Roy Hill uses to control the housekeeping routines for the whole plant. Then there are set job standards for each cleaning and housekeeping job. Finally Hill has developed his own system of keeping tabs on worker performance. The time cards not only describe the day's work to each worker. They also serve as a constant record of work done.

"I hate maintenance," says Hill, "and that's why I do whatever I can to make my job as easy as possible." Hill, incidentally, supervises the plant's traffic, stores, packaging, and layout, in addition to his maintenance duties. "My direct supervision of the housekeeping people won't exceed 10 minutes a day," he says. "And—as a matter of fact—it's possible to do this job without supervision at all, now that our standards are all set and the system has proved itself in operation."

Supervising Besly-Welles' plant housekeeping is easy because the supervisory function is part of a system that almost runs itself. Payoff? Take these examples:

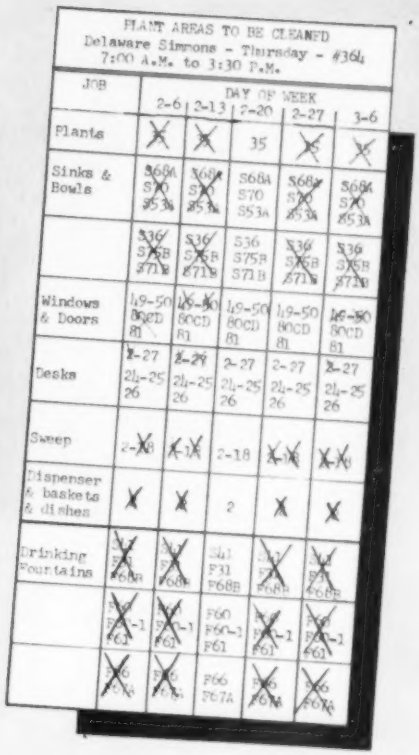
- Before Hill set up his system in 1952 it took 10 people just to keep the plant swept—at an annual cost of $23,000. Now three people do the job for $5870. The rest of the housekeeping chores are done with equal efficiency. Today it takes only 11 people (including three watchmen) to keep the entire plant in showroom condition.
- Aisle lane markings (result of Besly-Welles' research) now last twice as long as they used to. A semi-gloss traffic paint lasts 16 months; old paints, 8 months. Thus the company has cut the labor cost in half.
- Three men with vacuum sweepers have been eliminated by purchase of a new mechanical sweeper that doubles as a cleaner of ductwork, production equipment, and hard-to-reach niches in the plant.

One big factor in Hill's success is that he constantly tests his materials to make sure they are the best. He has standardized on 23 specific materials to fill functions such as cleaning urinals and stools, absorb-



DELAWARE SIMMONS - #364

SUNDAY	- DOES NOT WORK.
MONDAY	- 7:00 A.M. TO 3:30 P.M.
LIGHTS	12 - 37 - 3
SWEEP	2 - 18
DUST	68-A - 9 - 5 - 7 - 8A - 8B - 10 - 10A - 10B - 15 - 16 - 29 - 35A - 35B - 33 - 34 - 43 - 44 - 19 - 80C - 80D - 81
DUST FILES	68A - 9 - 5 - 7 - 8A - 8B - 10 - 10A - 10B - 15 - 16 - 29 - 35A - 35B - 33 - 34 - 43 - 44 - 19 - 80C - 80D - 81
DESKS	2 - 31 - 19 - 7 - 35B - 35A - 33 - 34 - 9
CLEAN ASH TRAYS	68-A - 9 - 5 - 7 - 8A - 8B - 10 - 10A - 10B - 15 - 16 - 29 - 35A - 35B - 33 - 34 - 43 - 44 - 19 - 80C - 80D - 81
OFFICE & TOILET WINDOWS	8A - 8B - 10A - 10B
DRINKING FOUNTAINS	F-41 - F-31 - F-68-B - F-60 - F-60-1 - F-61 - F-66 - F-67-A
DISPENSERS & BASKETS	2
PICTURES	35A - 34 - 33 - 9
DOORS	23 - 41 - 11 - 14 - 32 - 2 - 36 - 27 - 68B - 34 - 31 - 19 - 5 - 10
DISHES	2
PLANTS	35
SINKS & BOWLS	S-2 - S-68-A - S-70 - S-53-A - S-36 - S-75-B - S-71-B - S-56



PLANT AREAS TO BE CLEANED
Delaware Simmons - Thursday - #364
7:00 A.M. to 3:30 P.M.

JOB	DAY OF WEEK 2-6	2-13	2-20	2-27	3-6
Plants	X	X	35	X	X
Sinks & Bowls	S68A S70 S53A	S68A S70 S53A	S68A S70 S53A	S68A S70 S53A	S68A S70 S53A
	S36 S75B S71B	S36 S75B S71B	S36 S75B S71B	S36 S75B S71B	S36 S75B S71B
Windows & Doors	49-50 80CD 81	49-50 80CD 81	49-50 80CD 81	49-50 80CD 81	49-50 80CD 81
Desks	2-27 24-25 26	2-27 24-25 26	2-27 24-25 26	2-27 24-25 26	2-27 24-25 26
Sweep	2-18	2-18	2-18	2-18	2-18
Dispenser & baskets & dishes	X	X	2	X	X
Drinking Fountains	F41 F31 F68B	F41 F31 F68B	F41 F31 F68B	F41 F31 F68B	F41 F31 F68B
	F60 F60-1 F61	F60 F60-1 F61	F60 F60-1 F61	F60 F60-1 F61	F60 F60-1 F61
	F66 F67A	F66 F67A	F66 F67A	F66 F67A	F66 F67A

. . . assign workers to jobs and areas . . . use daily cards.

ing water and oils, cleaning sinks, stripping wax, cleaning ceramic tile.

He has discovered that one highly promoted floor wax, for instance, is the worst of all floor coverings for Besly-Welles in terms of durability, initial cost, ease of application. "But," Hill points out, "that doesn't mean it's no good for anyone. Part of our trouble with the wax was due —no doubt—to the nature of our operation. The same is true of many of our other materials. Local conditions—the hardness and composition of water, annual mean temperature, cost of labor—all bear on our materials evaluation." Nevertheless, Hill credits the vigorous testing and re-testing of housekeeping materials with a major share of the cost cuts he's been able to effect.

ASSIGNING THE WORK

Here's a typical schedule for a Besly-Welles sweeper:

Monday—Sweeps Areas 47, 45, 46, 67A, 66B, 48. Vacuums all aisles. Empties the abrasive dust exhauster and the wastebaskets. Grinds metal chips, hauls chips, mixes and changes coolant, cleans ducts, dusts and cleans time clock and light and the bulletin board.

Tuesday, Wednesday, Thursday —Sweeper follows essentially the same routine.

Friday — Sweeps, vacuums, and empties wastebaskets and dust exhauster, sandblasts, grinds chips, hauls chips, mixes and changes coolants, cleans chips from machines, cleans ducts, and gets cleaning gas.

To keep the workers on their toes Hill arranges to have periodic inspections made by himself and the plant nurse. Each area washroom is checked in detail. The nurse grants a satisfactory or unsatisfactory mark for each Bradley, urinal, stool, floor, wall, mirror, soap dispenser, and cabinet shelf (among other things).

Hill follows up a bad report by talking to the man responsible. "If it recurs," he says, "we take disciplinary action. This may be a simple reprimand or—in extreme cases —discharge."

MOTIVATING WORKERS

A man new to Besly-Welles may start as a probationary sanitation worker. After one week of satisfactory performance he becomes a Class B maintenance worker with a minimum wage of $1.50 hourly. After a 240-hour probationary period a man graduates to Class A maintenance worker. In addition to higher pay the Class A man is judged capable of covering three times as much area (30,000 square feet) as a "Class B" man (10,000 square feet).

There's another incentive besides greater responsibility and higher pay for the maintenance man who excels. At Besly-Welles the policy is to promote from within. That means a Class A man who distinguishes himself has a crack at high-paying production work when an opening occurs. Openings come often enough to keep Hill's staff alert.

Now we'll give you a look at three top cost-cutting ideas at work for Besly-Welles.

Turn the page

Begins on page 84

Buffer-Vacuum Combo Saves One Man's Time

This combination buffer-vacuum machine does two operations at once. It vacuums grit and dust from the floor, then buffs the special wax compound (developed by Besly-Welles) that keeps the 40,000 square feet of tile floor gleaming.

Hill dreamed up the idea himself after he got to thinking about the separate operations of vacuuming and buffing. The machine eliminated one man's labor, saved $5000 a year.

New Rinse-Tank System Saves 60 Man-Hours

What used to take 75 man-hours a month now takes 15. That's the story of this new tank that cleans both egg-crate light fixtures and air-circulating filters.

Cleaning the egg-crate fixtures by hand was a hopelessly laborious task—so hopeless that workers only hit the crates once over lightly with a duster. Now, with the tank, one man can remove a set of 10, replace them with clean spares, wash and dry the set in five minutes, then get 10 more, and so on.

The air filters also used to present a difficult cleaning problem. Now they get cleaned monthly, go just as quickly as the egg crates.

Home-Made Scrap Chopper Is Six Times Better

This modified hammer mill came straight off the farm to do a quick, efficient scrap-grinding job for Besly-Welles. It's another Hill idea for making the housekeeping job easier. It eliminates one man, increases efficiency six times over. Here's how: In the old days two men used pitchforks to put scrap into barrels. Then they did the best job they could of tamping the scrap down in the barrel. But the best they could do was to jam 250 pounds into each barrel.

Today the average content of each barrel is 1400 pounds of scrap. Machine chops the scrap so fine that it easily fills every inch of available barrel space—without the extra man.

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individually enclosed LOW VOLTAGE BREAKERS

Deep removable cover

simplifies breaker inspection . . . adjustments

For fast, complete breaker inspection, use Allis-Chalmers individually enclosed low voltage breakers. Removing only the cover, instead of the entire breaker, provides full, easy access from all angles.

Easy installation, inspection, and operation are yours with Allis-Chalmers breakers. Get complete details. Call your nearby A-C distributor or office, or write Allis-Chalmers, Power Equipment Division, Milwaukee 1, Wisconsin.

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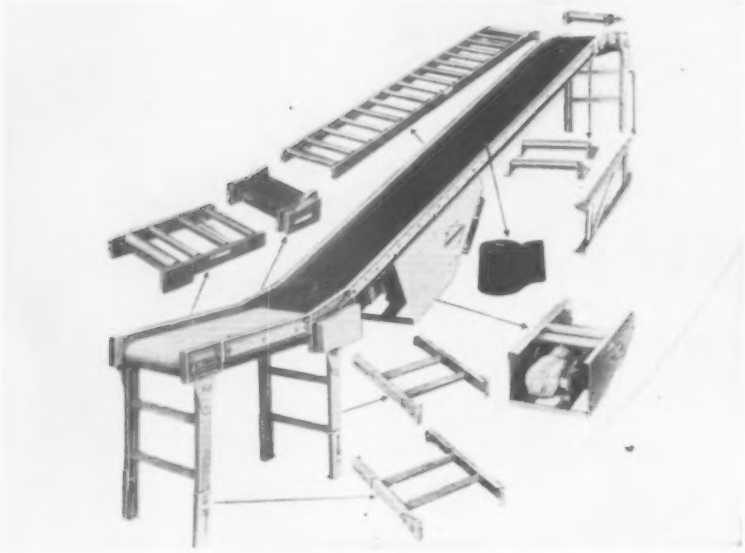
FACTORY EQUIPMENT NEWS

For more about these items, circle numbers on Reader Service Card next to back cover.



Build-It-Yourself Belt Conveyor

Have you a belt conveyor problem you can't solve with standard power conveyors now on the market? The answer is "E-Z-Build" low-priced components which can be quickly assembled to make custom belt conveyors for specific job needs. An unskilled worker with simple hand tools can put together these standardized, pre-engineered parts into level, inclining, or declining roller bed conveyors of any length, and in belt widths of 10, 14, 18, or 22 in.

Components include straight "intermediate" sections, top curves, feeder sections, drives, take-ups, belts, idlers, floor supports, ceiling hangers. Reversible end and center drives come in a wide hp. range. End drives can be mounted either under conveyor or on one side.

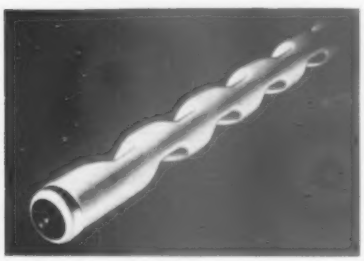
Alvey-Ferguson Co. (Circle 101).

102—Portable Food Server of stainless steel has food display area on top, storage shelf below for hot or cold dishes. Basic "Port-A-Teria" serves 250 people à-la-carte meals; other units may be added. Operates without kitchen service in remote areas. *Lincoln Mfg. Co.*

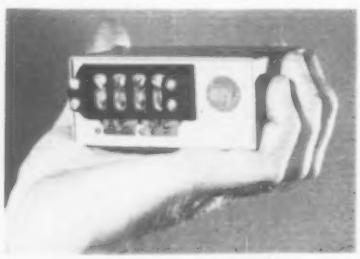
103—Gate Valves of steel alloy are suited to a wide range of corrosive conditions. "Split Wedge" of ball-and-socket design automatically adjusts to tapered seating surfaces. Sizes from ½- to 8-in. for 150-lb. flanged end; ½- to 2-in., 200-lb. screwed end. *Jenkins Bros.*

104—Storage Battery features replaceable cells for easy and low-cost maintenance in applications such as electric trucks and sub-station breaker tripping work. You can set up any desired voltage or amperage by adding or removing cells. *Scranton Cellomatic Battery Corp.*

105—Mercury Vapor Lamp will start under worst possible conditions, including temperatures of 20 below zero. Double-resistor and two fully operative main and starting electrodes make this possible. Maintains high lumen output during its 12,000-hour life. *Duro-Test Corp.*



106—Fluorescent Lamp, an improved "Power-Groove," produces 15% more light with 7% more power input. No increase in price. New design uses grooves along opposite sides of tube rather than along one side only. In 8-ft. lengths; 4- and 6-ft. later. *General Electric Co.*



107—D-C Voltage Supply, weighing 1-lb. 3-oz. is palm-sized. Replaces most standard and dry cells in recording and measuring instruments. Gives constant, accurate voltage from standard 115-v., a-c power source. Consists of 2-stage voltage stabilizer plus rectifier. *Hays Corp.*

108—Flexible Selenium Photocells can be shaped into any curved 3-dimensional configuration with as little as 1-in. radius of curvature. Useful for control applications, production flow processes, and automatic inspection and sorting. *International Rectifier Corp.*

Turn the page

This New **PLUG-IN** Welder Control

Lets You

ADD CONTROL FUNCTIONS AS YOU NEED THEM

A Wide Range of Plug-In Units Enables You to Add Components as Your Welding Jobs Change

HERE'S HOW YOU CHANGE YOUR BASIC CONTROL SIMPLY BY ADDING PLUG-IN UNITS

FOR WELDING MILD STEEL— BASIC CONTROL INCLUDES THESE PLUG-IN UNITS:

3B Timer
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Tube Firing Panel

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YOU ADD THESE PLUG-IN UNITS:

Heat Control
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Every feature you want —for every welding job

- **22 standard units provide "custom" control for every welding requirement**
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For more about these items, circle numbers on Reader Service Card next to back cover.

Two-Way Cleaner Re-Uses Fluid

Savings in servicing and maintenance of machinery, parts, tools, dies, and bearings are possible with this portable cleaning unit featuring re-usable solvent. "Kwik-Kleaner," a steel case measuring 20x20x10 in., is easy-to-use and can be quickly set up on or near a workbench. It soaks or brushes parts with a continual flow of solvent.

For soaking, a metal basket with 6-in. handles lowers small parts such as a carburetor into tank. For brush cleaning, parts as large as 12x20 in. are placed in filter tray in front of soak tank. A built-in pump, with no bearings below fluid line, circulates 3 gal. of solvent. It's powered by a 115-v., 60-cycle motor. Pump requires little maintenance and is guaranteed by the manufacturer for one year.

Fluid, filtered as it recirculates through fountain brush, may be regulated from a trickle to a flood. No solvent is lost by splashing. Aluminum brush with nylon bristles is connected to pumping unit by a 30-in. flexible plastic tube. *Nielsen Saw & Mfg. Co.* (Circle 109).

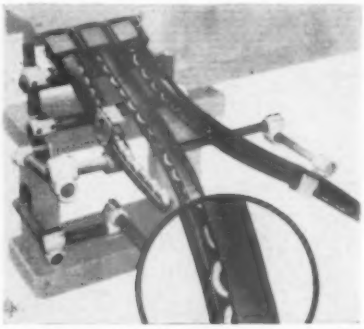
Picks Up, Mashes, and Stores Litter

Inexpensive vacuum-type trash pick-up for paper cups, plates, popcorn boxes, spoons, etc., automatically smashes and packs litter into attached burlap bag. Low-gravity center and ball-bearing wheels with extra-large tires assure easy handling and turning. Heat-treated aluminum smasher blade has 2½-hp., 4-cycle gasoline engine. Operates for hours on large fuel reserve. Covers ground area quickly with 30-in.-wide intake scoop. Low maintenance and operating costs. *Activeaire Devices, Inc.* (Circle 110).

111—Steam Cleaner is portable, low-priced unit designed for small-scale operations, and as standby or auxiliary cleaner for large operations. Two models: oil-fired, or gas-fired for stationary installation. Delivers 80 gph., at 60- to 100-lb. pressure. *Malsbary Mfg. Co.*

112—Solvent Recovery Unit is usable with processes where a water-immiscible solvent is lost by vaporization. Packaged unit shows a return where solvent costs are as low as $1000 annually. Small, low-priced, it picks up nearly all solvent odors in working areas. *Vic Mfg. Co.*

113—Bore Stock Sprockets provide over 600 possible pitch, teeth, and bore-size combinations. Permit maintenance storekeeper to fill finished bore sprocket needs by assembling interchangeable plates and hubs. And reduce inventory items by two-thirds. *Whitney Chain Co.*



114—Flexible Feed Track permits passage through "jungle-crowded" machine areas where fabricated track is impractical. Round, square, rectangular, triangular shapes; various sizes. Complex systems installed at low cost with standard fittings, clamps. *Campbell Machines Co.*

115—Skid Truck for narrow-aisle operation in congested areas. Telescopic lift adds to unit, 28⅜-in. from platform face to power unit bumper. Operates in 64½-in. right-angle aisle with 48x36-in. load. In 4000- to 6000-lb. capacities. *Automatic Transportation Co.*

Turn the page

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*3M will pay up to $300 installation charges on all first prize awards.

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HURRY—*Get your official entry blank and details from your "SCOTCH" BRAND Tape Distributor or 3M Representative. Use coupon below to request his call, or contact him direct.*

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Job_____

Company_____

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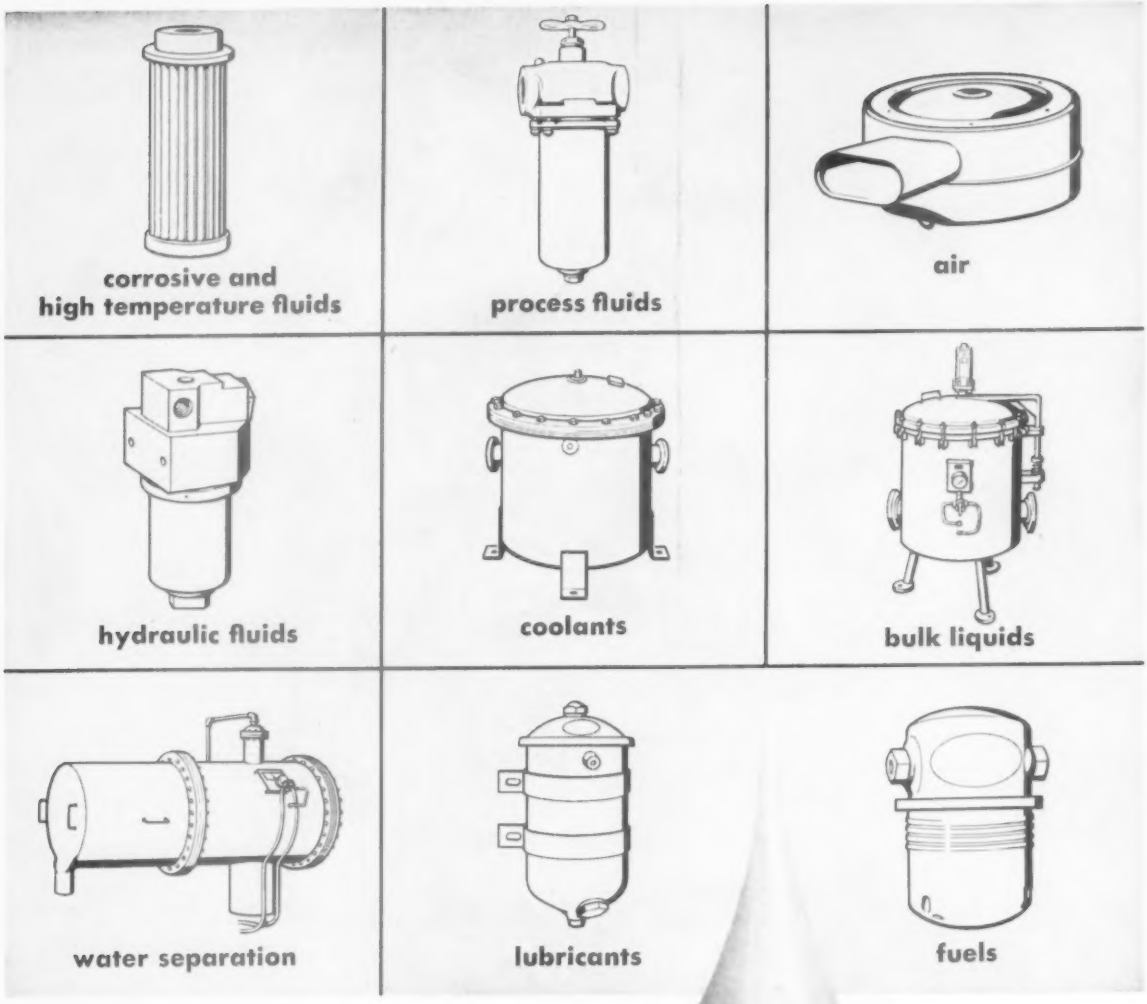

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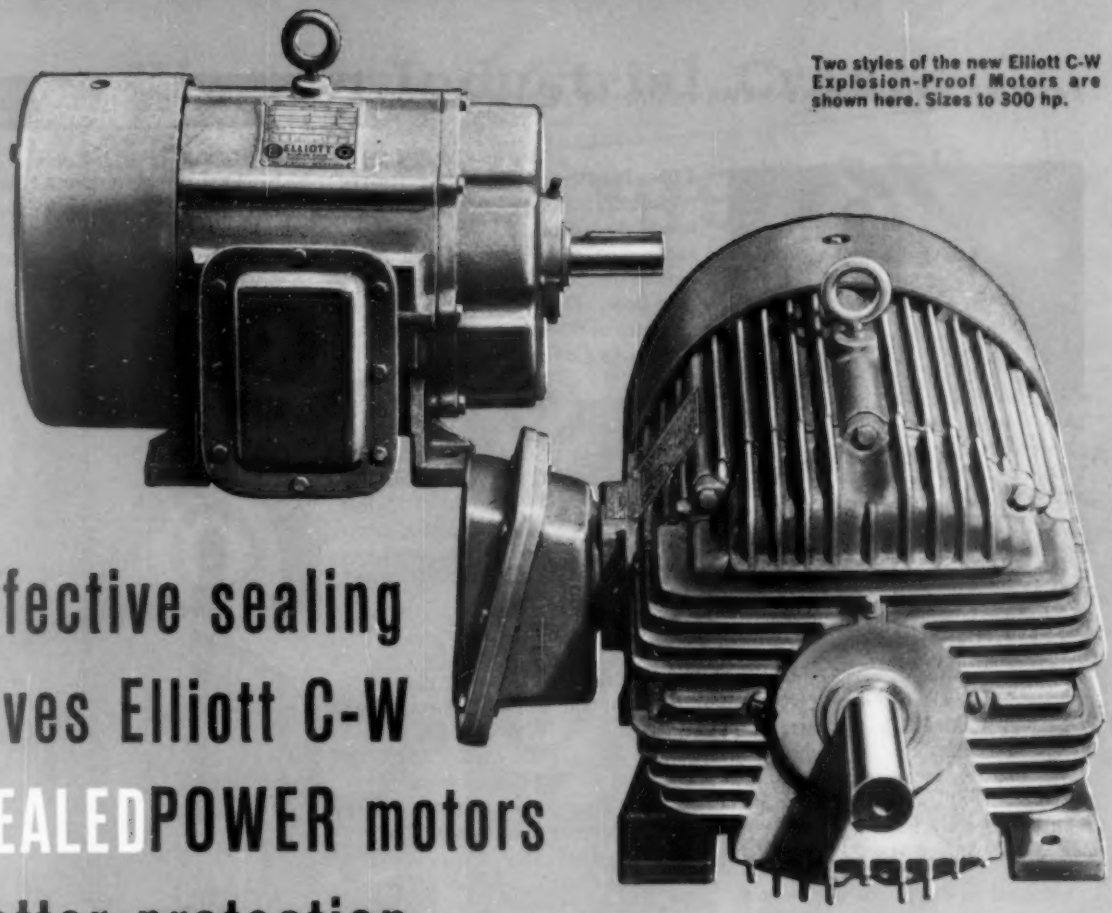


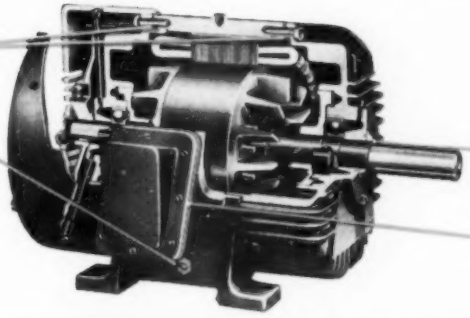
Two styles of the new Elliott C-W Explosion-Proof Motors are shown here. Sizes to 300 hp.

effective sealing gives Elliott C-W SEALEDPOWER motors better protection against moisture, dust, fumes, corrosion

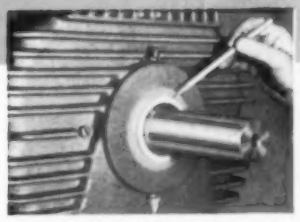
LONG, SNUG BRACKET SEAL. Close-fitting, deep rabbet provides explosion-proof type seal for all SEALEDPOWER motors.

EASILY ACCESSIBLE, automatic breather and drain plug, underwriters approved, for removing internal moisture accumulations.

NEW DATA on the complete line of Elliott C-W SEALEDPOWER motors is given in Elliott Bulletin PB 6000-2. Send for free copy today.

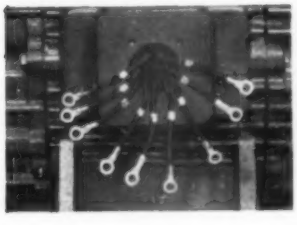


Elliott explosion-proof motor—underwriters approved.



ROTATING SLINGER PREVENTS entrance of dirt and moisture through the bearing and shaft opening.

NO LEAKAGE HERE. Tightly sealed leads and opening. Metal-to-metal fit between conduit box, frame and cover.



ELLIOTT Company

Crocker-Wheeler Plant Jeannette, Pa.

For more facts Circle 492 on Reader Service Card

For more about these items, circle numbers on Reader Service Card next to back cover.

116—"Imp" Air-Turbine Grinder cuts, grinds, deburrs, and polishes with ⅛-in. shank-mounted wheels or cutters. Delivers 75,000 rpm. at normal 90-lb. pressure. Features twist-type throttle. Air system blows chips away from work. Price: $49.50. *Aro Equipment Corp.*

117—Hydraulic Power Unit, suitable as standby power source, can be used with fastening tools, broaches, drills, and the like. Portable, only 31x16x15 in., it features variable volume, giving full pressure on demand. Capacity to 3.5 gpm., 3000 psi. *M. B. Sturgis, Inc.*

118—Lift Truck of 2000- and 3000-lb. capacities with 24-in. load center, affords full view of forks from driving position. Electrical contacts and hydraulic controls are mounted on underside of hinged top for fast maintenance. Turns in 50-in. radius. *Heifred Corp.*

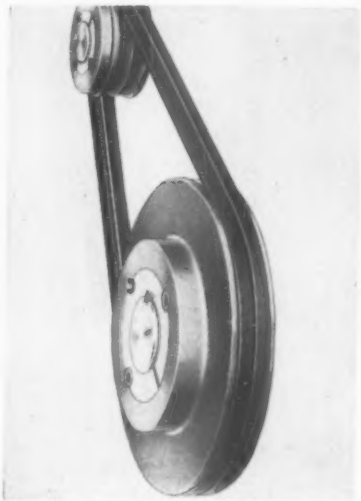
119—Dustless Drill permits work in populated areas and near machinery where dust damage is costly. Eliminates steel sticking—tank, a companion unit, collects cuttings through dust hose. Drill weighs 56 lb., and operates at 80-90 psi. *Westinghouse Air Brake Co.*

120—Portable Stacker fits through openings 6-ft. 6-in. high when hinged extension section is down. Lifts up to 1500-lb. loads to height of 55-in.; and to 90-in. when extended. Stop prevents over-travel. Also available in 2000-lb. capacity. *West Bend Equipment Corp.*

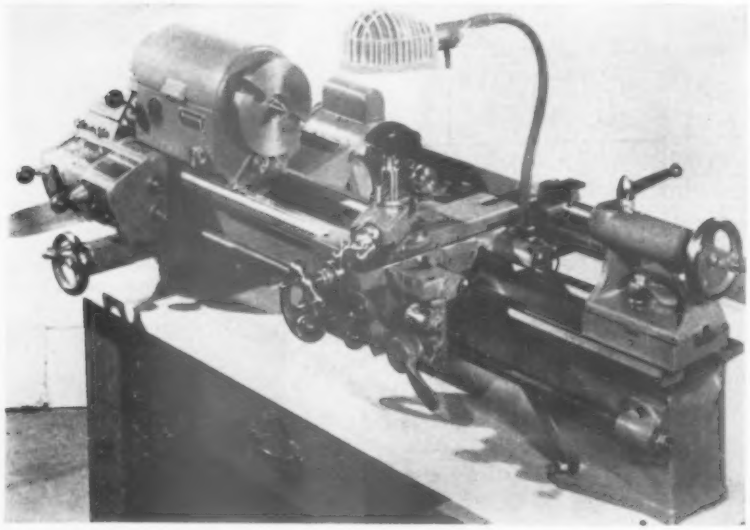
121—Milk-Shake Vendor dispenses pre-mixed cold shakes in 8-oz. paper cups for 15¢. Dairy packs mixed shakes in 5-gal. cans. Machine serves up to 500 drinks without reloading. Plugs into standard electric outlet, occupies less than 5½ sq. ft. *Glascock Bros. Mfg. Co.*

122—Digital Micrometer designed for unskilled operators, is specially suitable for measuring fragile or compressible materials. Makes over 20 readings per min. to accuracies of 20 millionths, with 20 grams pressure. No drift with continual use. *J. S. Dice Co.*

123—Air-Cooled Condenser, blower type, features low silhouette, making outdoor installations hardly visible from ground. Takes little space for indoor ceiling suspension. Capacity: 10 to 50 tons. For refrigeration as well as heating and ventilating. *McQuay, Inc.*



124—"Dyna-V" Belt Drives save space and weight, cut costs in power transmission with smaller, lighter sheaves and high-capacity belts. In ⅜-in. belt size, 1 to 10 grooves, for drives to 50 hp.; ⅝-in. size, 3 to 10 grooves, for drives to 200 hp. *Dodge Mfg. Corp.*



Low-Cost Metal Lathe

Variable-speed drive and ¾-in. collet are features of this 10-in. low-cost metal-cutting Delta lathe for heavy-duty work in metal-working shops, plant maintenance shops, toolrooms, etc. Speeds from 50 to 1500 rpm. are pre-set in either direct or gear drive, an advantage where repetitive work is desired. Lathe also features spindle ball bearings with lifetime lubrication; quick-change gear box with choice of 54 feeds or thread pitches; clutch allowing maximum settings for heavy cuts, or light engagement to avoid overloading motor. Priced under $700 without bench, ¾-hp. motor, or switch. *Rockwell Mfg. Co.* (Circle 125)

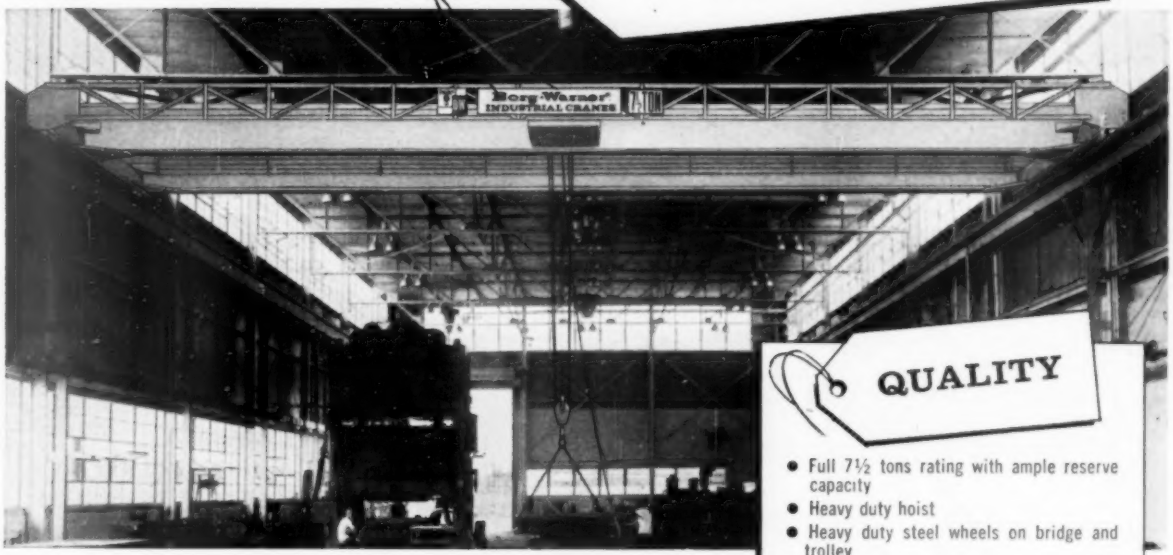
Turn the page

Borg-Warner Industrial Cranes

Quality at a price you can afford...

$9900.00

For a 7½-Ton, 60 Ft. Span,
3 Motor, Top-Running Double Girder
Industrial Service Crane



QUALITY

- Full 7½ tons rating with ample reserve capacity
- Heavy duty hoist
- Heavy duty steel wheels on bridge and trolley
- All welded jig bored and jig assembled end trucks
- Long life precision ball and roller bearings
- Large gusset plates at end trucks
- Outrigger machinery girder construction
- Heavy duty gear reduction bridge drive
- Fluid coupled bridge and trolley drives
- Full magnetic push button control
- Magnetic bridge brake

MODERN DESIGN

The crane illustrated is a typical double girder installation. For shorter spans, smaller capacities and lighter or intermittent duty Borg-Warner Industrial Cranes can supply your needs at even lower prices.

Why Borg-Warner Industrial Cranes are BETTER VALUES

Value is determined in QUALITY *and* PRICE . . . and, a price like this for superior Borg-Warner Industrial Cranes construction and performance assures you of top value for your materials handling investment.

If you want to boost your production and operating profits by making full use of overhead space for materials handling . . . if you can use the extra storage space an overhead crane will provide as compared with fork-truck stacking . . . if you can benefit from aisles and work areas cleared of floor-type handling equipment . . . it will pay you to consider a Borg-Warner top-running, motor-driven crane like this. The cost may be far less than you had imagined. One crane owner thought it would cost him nearly four times this price to duplicate his crane.

Borg-Warner Industrial Cranes offers a complete line of overhead cranes . . . for light, medium or heavy service . . . constant or intermittent service at slow, medium or high speeds . . . operation from cab or floor. Get in touch with B-W Industrial Cranes today for answers to your materials handling problems.

Industrial CRANES — INGERSOLL PRODUCTS — B-W — BORG-WARNER

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Distributors in all principal industrial cities

Borg-Warner® INDUSTRIAL CRANES

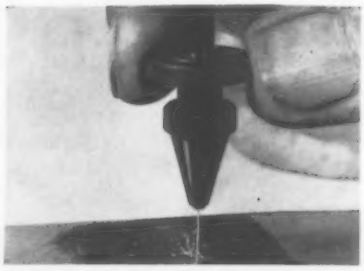
1540 S. PAULINA STREET, CHICAGO 8, ILLINOIS

Export Sales: Borg-Warner International, 36 South Wabash Ave., Chicago 3, Illinois

For more facts Circle 493 on Reader Service Card

For more about these items, circle numbers on Reader Service Card next to back cover.

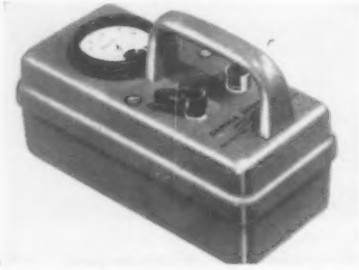
126—Conveyor Belt Drive has no V-belt, chains, etc., usually found in such units; motor and moving parts sealed in head pulley drum. Saves space, reduces maintenance; unaffected by dust, humidity, or weather. From ¼- to 15-hp.; standard widths. *Georg von Opel Corp.*



127—Small-Hole Driller, a precision tool for milling machines, jig borers, lathes, and drill presses, enables operator to control drilling pressure with fingertips. Locks in position. Drills last longer, stay sharper; work is done faster, more economically. *Hunter Tool.*

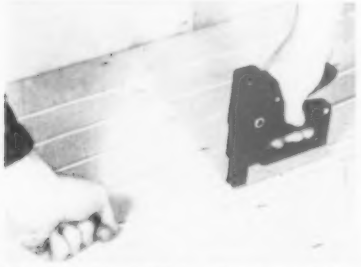
128—Strapping Machine, electrically and pneumatically driven, quickly applies steel straps to packages of all types and sizes. Control dial keeps tension uniform. Unlimited feed and take-up permits binding bulky cartons or as few as three small pipes. *Acme Steel Co.*

129—Tape-Controlled Turret Lathe lowers costs by providing quick set-up, faster machine operation between cuts, higher cutting speeds, constant quality. Controls feed, speed, turret indexing, etc. In 32-, 42-, and 52-in.-dia. table sizes. *Giddings & Lewis Machine Tool Co.*

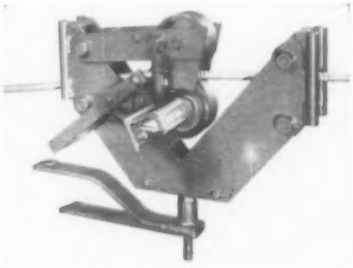


130—Radiation Detector, weighing under 5 lb., indicates leakage and true dose of x-ray installations; also shows strengths of radioisotopes in laboratories and industrial plants. Battery-operated, two controls are range switch and zeroing knob. *Victoreen Instrument Co.*

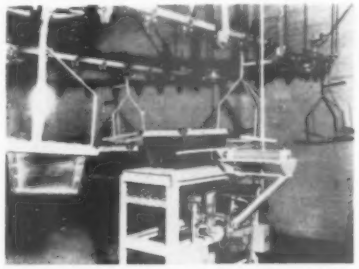
131—Portable "Power Center" for welding crews provides 440-, 220-, and 110-v. utility lines from one distribution unit. Heavy-duty cable connects center with nearest power source, replacing individual cords to each welder or tool. Fits outdoor use. *Electric Machinery Mfg. Co.*



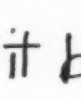
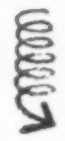
132—Control Wiring Stapler quickly and easily installs radiant heat cables and low-voltage wiring found in intercom systems and indoor phone wiring. Built-in guide automatically centers tacker over cable. Staple is crown-shaped to avoid damaging insulation. *Bostitch.*



133—Footage Meter measures wire, cable, plastic flexible pipe, hose, and wire rope in sizes ranging from ⅛- to 1¾-in. dia. Measuring roll, mounted on spring-loaded, pivoted arms, insures constant contact of roll with cable even if deformed. *Columbia Products, Inc.*



134—Automatic Tote Box Discharge is for "Cable-Way" overhead conveyors. Boxes are discharged automatically to gravity roller conveyor when station selector on carrier trips limit switch at chosen discharge point, activating air-operated pushers. *American Monorail Co.*

If it rolls on an axle or turns in a bearing or rides on a shaft if it slides in a groove or moves on a pivot  if it bores  or cuts or transmits pressure

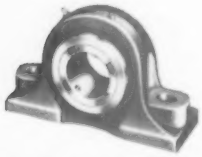
one of Sinclair's 500 specialized lubricants is designed to make it work better. For answers to your lubrication problems, write today to

SINCLAIR REFINING COMPANY

Technical Service Division
600 Fifth Ave, N.Y. 20 N.Y.

FLEXIDYNE
THE DRY FLUID DRIVE
New soft starts — overload protection

TAPER-LOCK
CHAIN COUPLINGS
No reboring — no waiting!



SC, SCM BALL BEARING
PILLOW BLOCKS
Quality, for normal and medium duty!

•

Write for Bulletins!

- ✓ Flexidyne Drives & Couplings.
- ✓ Chain Couplings and Sprockets.
- ✓ Bearings — Ball and Roller.

DODGE MANUFACTURING CORPORATION
400 Union Street • Mishawaka, Indiana

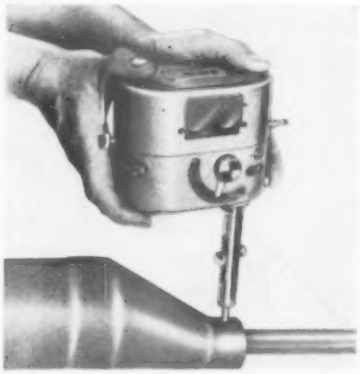
DODGE
of Mishawaka, Ind.

For more about these items, circle numbers on Reader Service Card next to back cover.

135—Hot Chocolate Vendor whips together powdered chocolate and water to make fresh cup. Costs 2¢ per 6-oz. serving. Table-size, it is easy to load and clean. Connects to 110-v. electrical and water lines. Stainless steel and plastic parts. *Vend-O-Matic Sales, Inc.*

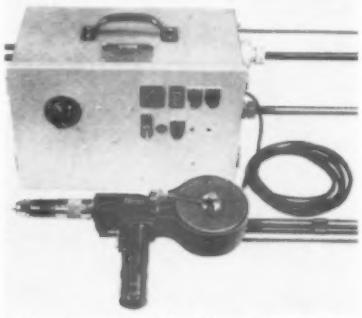
136—Electronic Data Processing system bridges gap between electromechanical accounting machines and electronic computers. Permits data processing on moderate scale. Has transistorized computer, transistorized auxiliary input and output equipment. *Radio Corp. of America.*

137—Platform Truck of lightweight magnesium and alloys, available in load capacities of 1200- and 2000-lb., is for heavy-duty handling. Features include a tread-plate deck surface, cast corners, rubber tires, removable handles. Rubber bumpers optional. *Magline, Inc.*



138—"Hand Vibrograph" simplifies machine maintenance by taping vibration readings of machines at regular intervals. When compared, tapes show progressive wearing of bearings, cutting tools, etc. Parts can be replaced before breakdown. Unit is lightweight—under 5 lb. *The Korfund Co.*

139—Paint Heater, with paint tract around heater element, provides maximum heat absorption without dangerous high temperatures. Comes with 1500-watt heating element for 115- or 230-v. operation. Capacity is 30 oz. per min., maximum temperature 160F. *Binks Mfg. Co.*



140—Manual Welding Torch for consumable-electrode inert-gas arc welding permits work in hard-to-get-at areas. Rated at 200 amp., this 3-lb. torch handles full welding range with $\frac{3}{64}$-in. aluminum wire. It's portable, easily maintained, and insulated at "hot" parts. *Linde Co.*

Turn the page

The big advantages of Taper-Lock mounting are now available for practically all of your sprocket installations. Below is listed the new wide range of types and sizes offered by Dodge!

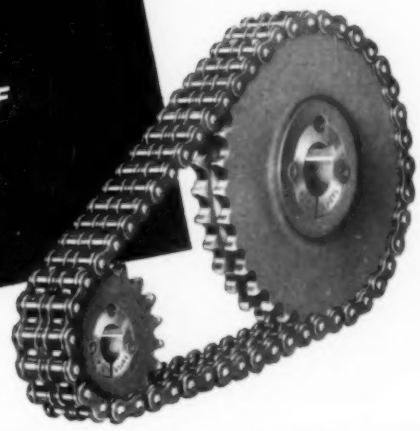
This important expansion of the Dodge line is the result of the enormous popularity of the Taper-Lock idea. Taper-Lock Sprockets are *modern*. Industry likes them because they go straight from shelf to shaft without machining—saving time. They are "easy on—easy off"—saving work. Their bushings can be re-used, not only in replacement sprockets, but in sprockets of different sizes and also in Taper-Lock Sheaves, Couplings, Conveyor Pulleys. Taper-Lock saves inventory—and money!

Dodge Taper-Lock Sprockets and Dodge Roller Chain are available through your local Dodge Distributor. Call him. Or write us for bulletin.

TAPER-LOCK®

ROLLER CHAIN DRIVES ARE NOW AVAILABLE IN A NEW WIDE RANGE OF TYPES AND SIZES

No Reboring!
No Keyseating!
No Waiting!



DODGE
of Mishawaka, Ind.

CALL THE TRANSMISSIONEER — your local Dodge Distributor. Factory trained by Dodge, he can give you valuable help on new, cost-saving methods. Look in the *white* pages of your telephone directory for "Dodge Transmissioneer."

DOUBLE PITCH CHAIN and SPROCKETS

Transmission Series (No. 2040 to 2080) and Conveyor Series (No. 2040 to 2100). Sprockets to 112 teeth—including, for the first time, stock sprockets of 17, 19, 21, 23, 25 and 35 teeth *made especially for double pitch chain*. Introduced by Dodge, these sprockets are designed for even distribution of tooth engagement and absolute accuracy of mesh. Wear is reduced by half. Life of chain and sprocket is doubled!

PLATE SPROCKETS

Steel Plate, Type A. No. 35 to 120. Mandrel bore, bored-to-size or Taper-Lock.

SINGLE STRAND CHAIN and SPROCKETS

No. 35 to 160. Sprockets to 112 teeth.

DOUBLE STRAND CHAIN and SPROCKETS

No. 35-2 to 80-2. Sprockets to 112 teeth.

STANDARD ATTACHMENTS

ALL TO ASA STANDARDS

DODGE MANUFACTURING CORPORATION, 400 Union Street, Mishawaka, Indiana

Foil-Backed Tape

HOLDS INSULATION TO DUCTWORK

Shuford's SHURTAPE® LF-65

Developed specifically to hold insulation to air conditioning and heating ducts, Shuford's SHURTAPE LF-65 has no measurable moisture vapor transfer rate and is highly resistant to water.

Finished installation is neater because the bright foil backing makes an inconspicuous seal . . . stapling is eliminated.

Use low-cost, pressure-sensitive SHURTAPE LF-65 for holding and sealing applications where silver colored tape is desired.

Aluminum foil laminated to 40 lb. Kraft

For complete information, write

CLOTHES LINES • TWINES
PRESSURE-SENSITIVE PAPER TAPES
SASH CORDS • WEATHER STRIPPING
COTTON & RAYON YARNS • EXTRUDED PLASTICS

Shuford Mills, INC SINCE 1880 HICKORY, N. C.

3613 **World's Largest Manufacturer of Cotton Cordage**

For more facts Circle 497 on Reader Service Card

FACTORY / EQUIPMENT NEWS

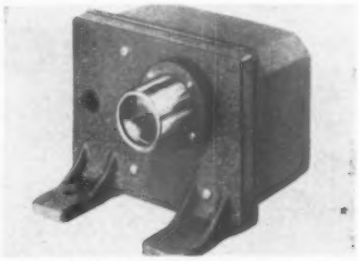
Begins on page 88

For more about these items, circle item numbers on Reader Service Card next to back cover.

141—Automatic Transfer Machine does high-speed milling, centering, boring, threading, deburring, cut-off, spinning, etc., in combination, on both ends of tubular or solid round stock up to 2-in. dia. Cycles at maximum rate of 3600 pieces per hour. *Walter P. Hill, Inc.*

142—Gas-Fired Unit Heaters with 25,000- to 250,000 Btu./hr. capacity, feature contoured aluminized-steel heat exchangers. Combustion in individual tubes for maximum heat transfer. Automatic, positive safety controls; 115 v., 60-cycle motor. *Westinghouse Electric Corp.*

143—Bench-Type Electric Furnace electronically holds pre-set temperature to close limits. Has combined control and temperature indicator. Operates continuously to 1650F., intermittently to 1900F. Safety door; 115- and 230-v. rating, 2150 watts. *Thermo Electric Mfg. Co.*



144—Tubeless Photoelectric Control uses cadmium cell sensing element with magnetic amplifier. Needs 10 foot-candles minimum to operate, with .04 sec. minimum dark and light time intervals. Aluminum housing with splashproof gasket seal. *Autotron, Inc.*

Turn the page

POWELL

LUBRICATED PLUG VALVES

Powell Lubricated Plug Valve, worm gear operated. Fully enclosed gear housing is a safety feature and protects against injuries and damage from the elements and tampering.

Like all Powell Valves, Powell Lubricated Plug Valves are superior in their field . . . and have many advantages over conventional types of Valves:

- Simple design: Only three basic parts—Body, Bonnet, Plug.
- Quick, complete shut-off.
- Tapered plug assures positive seating.
- Machined surfaces of plug and body are not exposed in open position.
- Cavity-free straight passage assures streamlined flow.

Powell Lubricated Plug Valves are available in sizes ½" through 16", depending on the type required—Semi-steel 175 and 200 pounds WOG; Carbon Steel ASA 150 and 300 pounds.

Powell can also furnish Lubricated Plug Valves in other alloys on special order.

For all your valve needs, consult your local Powell Distributor—or write directly to us. Send for our new Lubricated Plug Valve Catalog, Number PV-5.

The Wm. Powell Company • Cincinnati 22, Ohio

Dependable Valves Since 1846

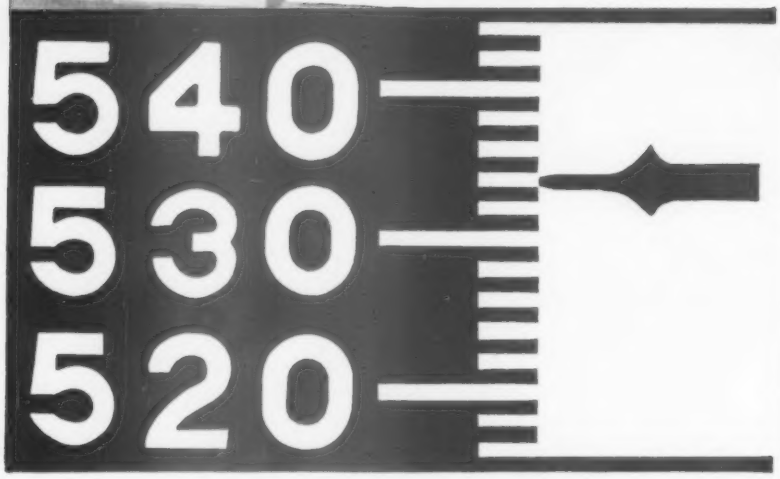
POWELL...world's largest family of valves

For more facts Circle 498 on Reader Service Card

HOWE

WEIGHTOGRAPH

READ WEIGHT IN NUMBERS THIS BIG



NO MORE "SCALE SQUINT!"

Pin up this ad and look at it from across the room—see how easy it is to read the weight! You can attach a Howe Weightograph to any beam scale, from small bench scales to the largest truck and railroad scales; different models available for different capacities. Standard models plug into ordinary electric outlet. So much easier, faster, more accurate, it quickly pays for itself. Use indoors or out . . . adjusts to eye level . . . parallax errors are completely eliminated.

Send for this detailed booklet and local representative's name—see the Weightograph demonstrated!

HOWE

THE HOWE SCALE COMPANY • RUTLAND, VERMONT

A SUBSIDIARY OF SAFETY INDUSTRIES, INC.

ELECTRICAL DIVISION • ENTOLETER DIVISION
LIGHTING DIVISION • AUTOMATIC TIMING & CONTROLS

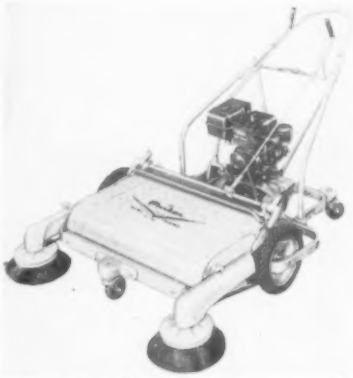
FACTORY / EQUIPMENT NEWS

Begins on page 88

For more about these items, circle item numbers on Reader Service Card next to back cover.

145—Speed Changer in horizontal or vertical units for stepless, instant speed variations. Maximum speed ratio 10:1 in 1- to 3-hp. units; 4:1 in 40- to 60-hp.; 6:1 in intermediate units. Remote control available. Said to give 78% over-all efficiency. *Allis-Chalmers Mfg. Co.*

146—Series-Multiple Switch permits increase of system voltage without changing pole-type transformers. Available in 5 to 167 kva., can be installed at system voltage, uprated later. First switch position is multiple connection; second, series connection. *Kuhlman Electric Co.*



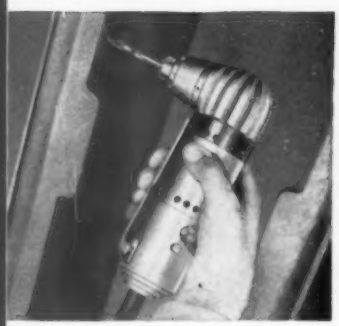
147—Motorized Floor Sweeper with 1-hp., 4-cycle motor, covers 50,000-sq.-ft. per hour. Collects dirt, trash, paper, scrap; hopper emptied and replaced in seconds. Controls at hand level. In 20- and 28-in. sweeping widths; brush adds 6 in. more. *Parker Sweeper Co.*

Turn the page

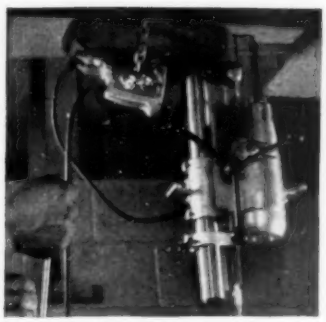
For more facts Circle 499 on Reader Service Card

For more facts Circle 500 on Reader Service Card ➤

There's a Black & Decker Drill powered for every job!



LITTLE SHORTY'S the drill you want for those hard-to-get-to, around-corner jobs. Gets in tight spots! Excellent for small unit assembly.



DRILLS UPSIDE DOWN! B&D Magnetic Drill Press sticks to the wall like a fly; operates manually or with exclusive remote control.

TREMENDOUS TORQUE for the tough jobs. ⅜" H.D. Holgun® is geared and powered to take on the hard ones. Compact to work in close quarters.

MOST POWERFUL drill of its size available, the ¾" Standard! A rugged tool with plenty of zip in reserve. Fully reversible; positive drive chuck.

71% of purchasing agents say make mine Black & Decker!

A recent industrial publishing company survey reveals that when purchasing agents need electric tools most think first of Black & Decker! One reason why: 33 *different* drills each designed to give you the power you need *plus* easy handling and long, troublefree life!

If you have a drill problem—a small hole in trim to a large hole up among the structural steel—be sure to see Black & Decker. Better still, mail the coupon for a free demonstration of our drill line. THE BLACK & DECKER MFG. CO., Dept. 0703, Towson 4, Maryland. (In Canada: Brockville, Ontario).

Leading Distributors Everywhere Sell

Look Under "TOOLS-ELECTRIC" in Yellow Pages

Black & Decker®

Quality Electric Tools . . . Power-built for top performance

MAIL COUPON FOR FREE DEMONSTRATION

THE BLACK & DECKER MFG. CO., Dept. 0703, Towson 4, Md.

☐ Please arrange for a demonstration of the following drill(s) .....

☐ Please send me additional information.

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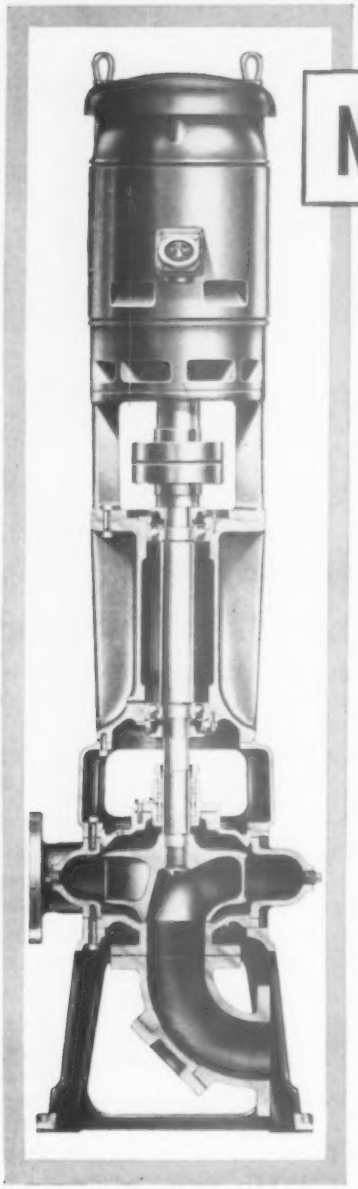
For higher pumping efficiency

of solids in suspension!



NEW

Fairbanks-Morse

5440A Non-Clog Pumps

Ideal for pumping unscreened liquids with large solids in suspension

- **industrial wastes**
- **sanitary sewage disposal**
- **industrial processes**

Here is your answer to higher efficiencies wherever you are pumping solids in suspension!

All-new Fairbanks-Morse 5440A Non-Clog Pumps feature quick, easy convertibility between any of the many vertical and horizontal types. Power requirements of the pump are always perfectly matched to the electrical and mechanical components. Precision-machined centering fits assure accurate alignment. Exclusive F-M bladeless impeller design minimizes maintenance by preventing clogging from solids and stringy material. The 5440A is only one of many F-M solids-handling pumps designed to meet a broad range of requirements. For information, write Fairbanks, Morse & Co., 600 S. Michigan Ave., Chicago 5, Ill.

Ask for new 5440A BULLETIN!

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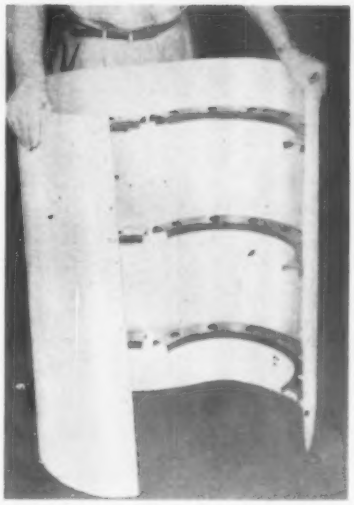
ELECTRIC MOTORS · DIESEL, DUAL FUEL AND GAS ENGINES · PUMPS
COMPRESSORS · GENERATORS · MAGNETOS · HOME WATER SYSTEMS

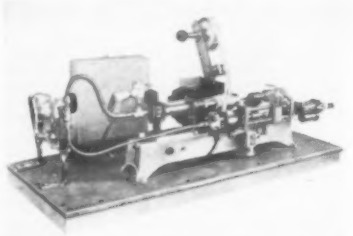
For more facts Circle 501 on Reader Service Card

For more about these items, circle item numbers on Reader Service Card next to back cover.



148—Jacket Rings hold aluminum covering around hot stacks or other hot piping. Ring 2-in.-wide has air holes to allow upward escape of heat. Come in 180F. segments of any diameter; also with factory-attached aluminum jacketing. *Preformed Metal Products Co.*

149—A-C Welder gives positive control of 165-v. open circuit; also arc stability. Elimination of d-c component means better hand or automatic TIG arc welding. Rated current: 10-300 amp. Hand welding voltage reducer is "fail safe." Remote control. *Miller Electric Mfg. Co.*



150—High-Speed Production Lathe adjusts to various-size armatures, is low-cost finisher of small motor commutators used in portable power tools, etc. Automatic or semi-automatic; 110-v., 60-cycle motor. Cycling equipment uses 60-lb. air pressure. *Frank N. Wood Co.*

Turn the page

Now from Du Pont Research comes a new kind of paint that definitely *retards the spread of flame.*

Rigorous testing by Underwriters' Laboratories has proved conclusively that Du Pont Fire Retardant Paint helps answer the plea of firemen to "Find a way to give us a 5-minute jump on most fires and we can control them."

Du Pont Fire Retardant Paint is a durable, washable interior flat finish that *looks, applies and wears like regular flat wall paint.* It can be brushed, rolled or sprayed . . . comes in seven eye-pleasing colors: Sunlight Yellow, Pale Blue, Daylight Green, Light Green, Pale Pink, Guards Gray, Ivory—and White.

Du Pont Fire Retardant Paint may well be "the ounce of prevention" that helps save you from a disastrous fire loss. Send today for your FREE copy of the Du Pont Fire Retardant Paint folder. Just clip and mail the coupon below.

DU PONT

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Finishes Division, Dept. FM-93
Wilmington 98, Delaware

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With these 3 RIDGID® Jam-Proof Pipe Threaders

my power drive threading is

Safe—no watching to keep them from jamming...save me a lot of time, too!

1" to 2" Pipe RIDGID 65R-TC

Jam-proof—can't jam if you forget it . . . Threads 4 sizes of pipe and conduit with 1 set of dies . . . True-Centering workholder—no more crooked threads—but adjustable for drip threads. Far more for your money—compare!

2½" to 4" Pipe RIDGID 4PJ

Jam-proof . . . drive pinion kicks out automatically—real safety when power threading. Workholder sets to size before putting on pipe. Other exclusive advantages. Special 4PJ for conduit.

4" to 6" Pipe RIDGID 161

Jam-proof for safe power threading. 1 set of dies threads 4", 4½", 5" and 6" pipe and conduit—sets to size fast. Workholder sets to size before putting on pipe, a work-saver feature. Many other reasons why the 161 is your best buy!

See and try these popular RIDGID Threaders...at your Supply House.

The Ridge Tool Company Elyria, Ohio, U.S.A.

THREADED PIPE...*It's Tight...It's Best...Costs Less!*

For more facts Circle 503 on Reader Service Card

FACTORY / EQUIPMENT NEWS

Begins on page 88

For more about these items, circle item numbers on Reader Service Card next to back cover.

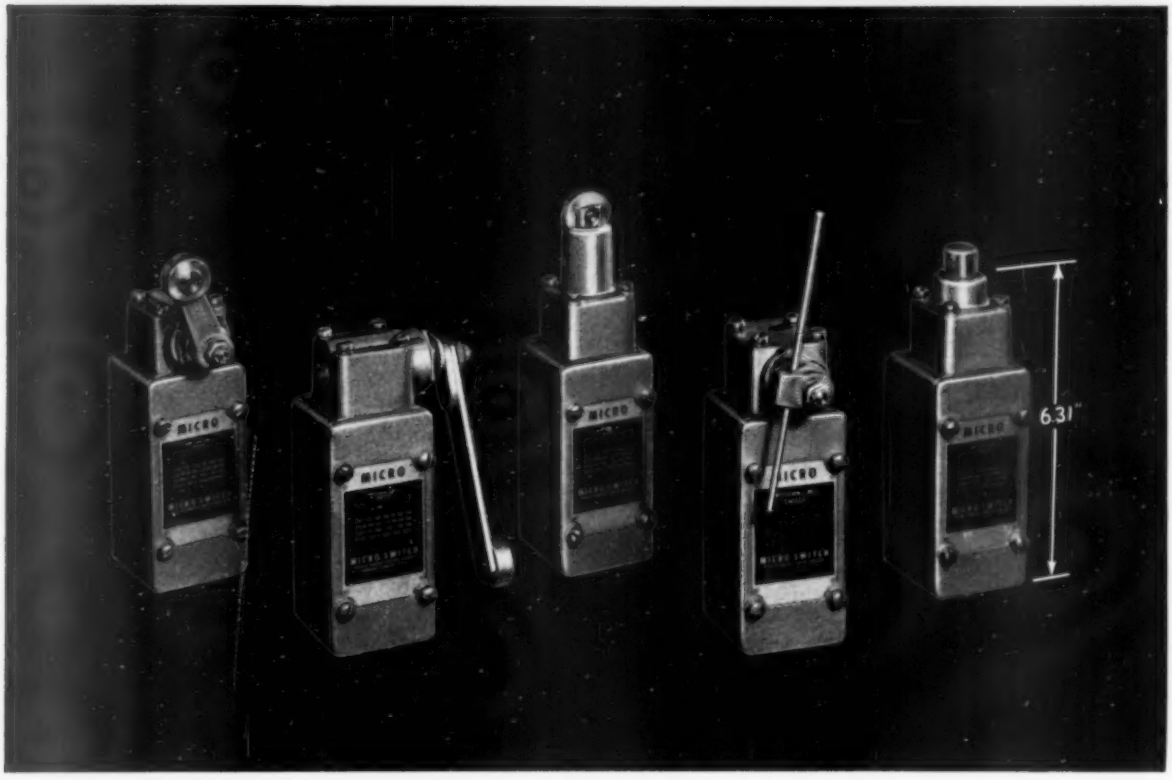
151—A-C Adjustable Speed Drive supplies precise operating speeds for machine tools, process machinery, etc. Uses no brushes, commutators or slip-rings for lower maintenance. Ratings from ¾- to 7½-hp.; speed, 34 to 1. Feedback circuit monitors speed. *Louis Allis Co.*

152—Fluid Regulator for spray painting systems provides constant pressure at spray nozzle regardless of line pressure. Comes with single or double inlet for circulating or direct supply systems. Regulator diaphragm withstands temperatures to 200F. *Binks Mfg. Co.*

153—Reflectors—lamps to 200 watts—have shallow or deep bowl, angle or standard domes for exposed or damp locations damaging to ordinary units. Vents encircle fixture permitting air flow for cooler operation, longer life, cleaner unit. *Stonco Electric Products Co.*

Turn to page 125

MICRO SWITCH Precision Switches



Sealed "ML" switches with roller lever actuators, roller plunger actuator, low-force rod actuator, straight plunger actuator. Operating force ranges from 5 oz. for the rod actuator to 6 lbs. for the straight and roller plunger actuators.

"ML" Series sealed limit switches for heavy-duty industrial applications

Long-life precision switching elements in sturdy sealed aluminum housings characterize the "ML" switch family. "ML" switches have proved beyond doubt their ability to stand up under extreme mechanical punishment in the worst of environments . . . are widely used on machinery and other industrial equipment.

Sealed "ML" limit switches meet NEMA standards for non-ventilated enclosures of type IV-1C1.12 watertight and type VI-1C1-1.15 submersible.

Additional advantages of "ML" switches include:

- Adequate wiring space
- Switching elements have #8 screw terminals
- Additional actuators available
- Sealed covers secured with captive screws

Contact arrangements (and abbreviated electrical ratings to show range) include:

Two-circuit double-break—up to 600 vac.
Single-pole double-throw—up to 600 vac.
Double-pole double-throw—10 amps., 125 or 250 vac.

These switches are available through the Authorized Distributor near you. Help in switch selection is available from MICRO SWITCH branch offices. Consult the Yellow Pages. For complete description of "ML" and other heavy-duty switches, send for Catalog 84.

MICRO SWITCH . . . FREEPORT, ILLINOIS
A division of Honeywell

In Canada: Honeywell Controls Limited, Toronto 17, Ontario

Honeywell
MICRO SWITCH PRECISION SWITCHES

For more facts Circle 504 on Reader Service Card

New Super Coilife gives rewound motors extra life

Moisture, acids, alkalis and other contaminants are locked out once and for all with Super Coilife epoxy encapsulation. For full motor protection, Super Coilife can be applied to random wound stators, rotors and armatures. Super Coilife's mirror-like finish will not crack or craze under severe operating conditions.

Because of its unusually low viscosity, this new solventless epoxy completely penetrates the interstices, through the slots, thoroughly coating and protecting the windings. Since 1953, when Westinghouse introduced Coilife* epoxy encapsulation, research, engineering and development have evolved this new and improved product—Super Coilife, an exclusive process.

Only Westinghouse Repair Plants can give the right "thin-wall" thickness for each type and class of winding to give maximum heat transfer away from the windings. Before you send out your next rewind call your Westinghouse representative for the complete story or write for Booklet B-7622: Westinghouse Electric Corporation, P. O. Box 868, 3 Gateway Center, Pittsburgh 30, Pa.

*Trade-Mark J-95197-A

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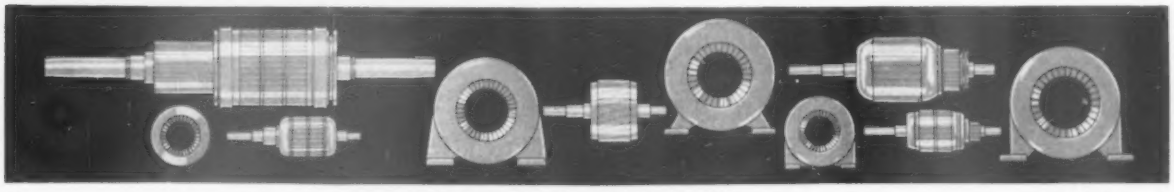
USE WESTINGHOUSE MODERN MAINTENANCE SERVICE... SHOP REPAIRS... RENEWAL PARTS... FIELD SERVICE

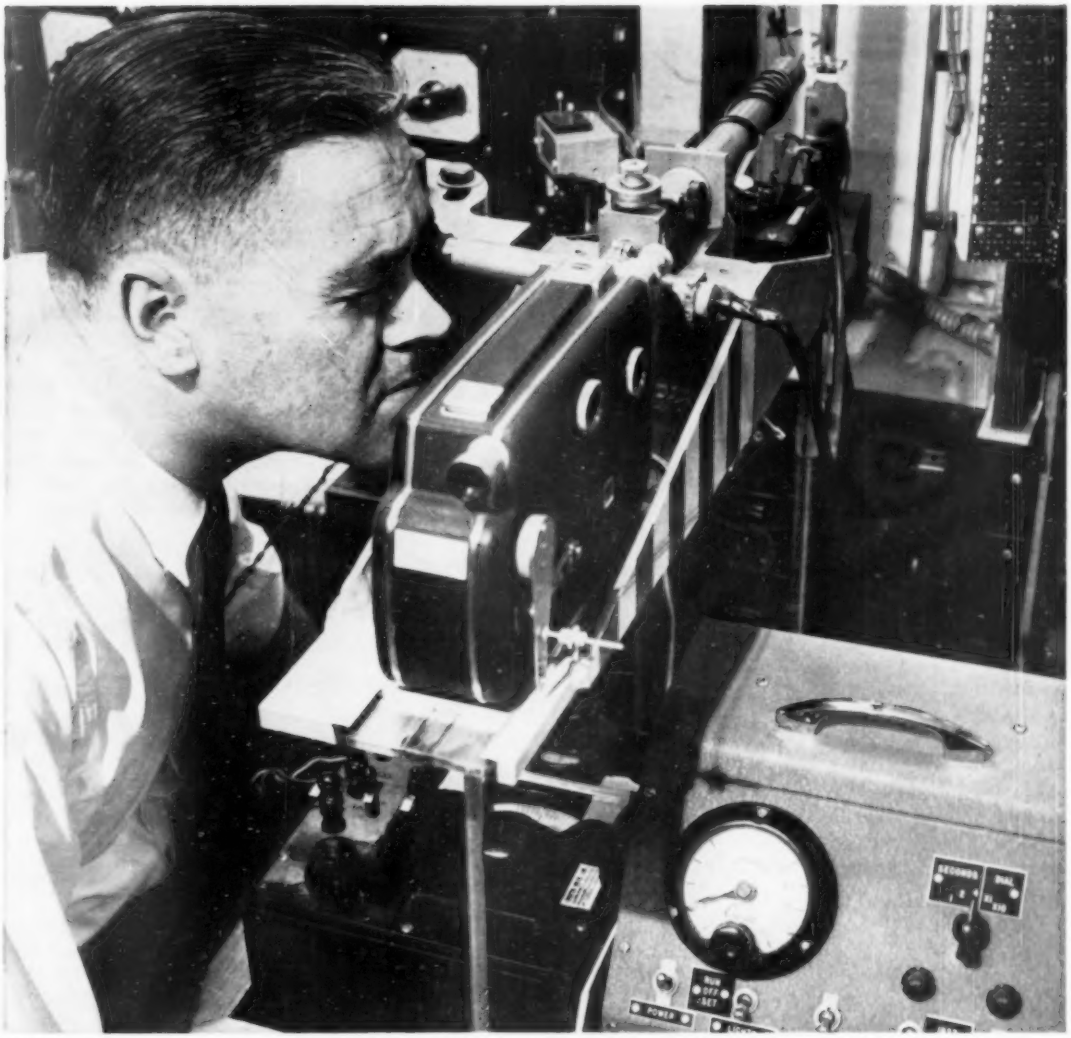


FACTORY

PLANT OPERATING MANAGEMENT

CASE BOOK

WARREN J. KING
Manager, Features and Departments



MAN WITH A CAMERA: PRECISE MONITORING OF CREEP-STRAIN TESTS ON 16MM . . . PAGE 111

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FACTORY CASE BOOK

NO. 18 MARCH 1959

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Conveyor Cuts Assembly Cycle

A 96-ft. conveyorized line equipped with seven turntables has streamlined assembly of two Copyflex table models at the new Charles Bruning plant. Over the old bench-assembly method, the new set-up gives four advantages:

- Faster assembly—Operators can now complete machines in 2.7 and 3.7 man-hours per unit, depending on the model. The old method required 4.5 and 7.2 hours.
- Less floor space—Conveyor assembly uses 2100 square feet; old set-up, just under 3900.
- Reduced operator fatigue—Because all parts are immediately adjacent to the conveyor, assemblers find the new method less fatiguing. And formerly operators moved from machine to machine, whereas now machines move to operators.
- Improved quality—Now there's detailed in-line inspection at every point. And during the last two stages of assembly, actual operating inspection takes place. In the prior assembly method line inspection was almost impossible because of the multiplicity of movements and activities going on simultaneously in scattered locations.

The conveyor installation uses standard gravity sections and costs less than $1000. Starting with a machine frame at one end, units are progressively assembled at seven work stations. At each Lazy-Susan turntable operators assemble parts to the front, back, and sides of each unit without moving. Automatic stops secure the turntables in any position. And part of the final shipping crate acts as a pallet for the machine. At the far end of the line, machines are crated.

Source: John P. Arndt, Works Manager, Charles Bruning Company, Mount Prospect, Ill.

A Real Solution for Reel Problems

How do you store reels without wasting valuable warehousing space? The Upson Walton Company, a Cleveland shipping concern, has an answer. Lay 'em on their sides (photo).

Key to the system is a special toggle suspended from the overhead

crane (Euclid Crane & Hoist Company, Cleveland). With this toggle, one man—the crane operator—can run the whole show from the floor. What about space saving? At least 50%, reports Upson Walton. And the toggle cost only $50.

Here's how it works: The toggle is lowered through the hole in the reel by the crane operator. Because of an off-center hinge design and the toggle's weight distribution, it opens up inside the reel drum to resemble an inverted T. As the slack is taken up by the crane, the toggle engages the bottom inside surface of the upper drum face. This provides the necessary support for the lifting action when the crane cable is tightened.

To disengage the toggle from the reels the operator does the same thing in reverse. He slackens off to a point where the crossbar again recesses into the main member. Then entire toggle is withdrawn from reel through the center hole.

Coating Rescues $125,000 Tank

A $125,000 bill for replacement of a water storage tank has been saved by the City of Lansing, Mich., thanks to a plastic coating technique. Cost of the project: $5500. Took four men only a week to complete, carries a five-year guarantee.

When erected in 1923 the 55,000-gal. tank for the city's water-softener system was constructed of ¼-in. steel plate. But corrosive action had reduced the plate thickness by approximately half. And there were actually some holes at the surface water line.

Laminating plastic material on the inside of the tank filled the holes and reinforced the walls. After sandblasting the entire interior to clean off former coating materials, workers rolled on a coat of resilient plastic material, then covered it with a sheet of fiber glass cloth (photo). This laminating process continued until the required coating thickness was obtained. At the water-level area two additional layers of glass cloth and plastic were applied for added strength. Result of the process is a plastic shell within the steel tank.

Retirees Plan Their Own Party

Thinking of having a party for retired employees? Then why not let prospective retirees still working in the plant help plan the party, invite guests, and act on the committee for the social hour?

Scully-Jones and Company (Chicago) used this approach, found that it benefits three ways. First, retirees enjoy themselves, are reassured that the company hasn't forgotten them. Second, present employees notice this reaction and their confidence in management increases. Third, Scully-Jones' community reputation is boosted because of this kind of employee interest.

Here's how the party at Scully-Jones took shape:

1. Three future retirees worked on party plans with management.
2. All retirees were contacted personally, informed of the company's plans for a get-together.
3. Printed invitations were mailed to the retirees' homes to back up the personal invitation.
4. On arrival at the plant on the big day, members of management greeted retirees and their wives. On a tour of the plant they renewed old acquaintances, chatted with old friends. Those who did not want to tour the plant were shown movies or listened to stereophonic records. All were served refreshments.
5. Dinner followed. One member of management and his wife acted as host at each table.
6. After dinner, three top officials of the company and a Social Security Board representative addressed the gathering. And all through the proceedings Polaroid pictures were taken. Copies went to anyone who requested them.

Camera Records Micro-Sleuthing

(Cover Story)

With a 16-mm. camera The Martin Company monitors microscope creep-strain tests at its Baltimore engineering lab. To record progress at high temperatures, a furnace (upper right) swings aside to disclose test specimen with small, scribed, slide-rule-type platinum gage clamped in place. Microscope magnifies specimen and gage. Reflex passes image to camera and optical viewer.

An imposition device feeds time, stress, and temperature data to the film. Solenoid-timer (lower right) can be set for readings at intervals between 64 frames per second and one frame every 10 hours. A battery of cameras, linked to a single timer, can make synchronized records of several types of data.

Automatic Testing for Missile Parts

Automatic and semi-automatic test stands help Westinghouse Electric Corporation (Pittsburgh) perform a myriad of tests on a missile target seeker. The equipment saves time, eliminates human errors, increases reliability, and reduces cost. With it, unskilled personnel can do the testing job.

Component parts are checked in preliminary stages for minimum and maximum tolerances, thereby assuring interchangeability of units. Thus any fault or error is quickly pinpointed. As manufacturing progresses, combined components are checked and then a final stand tests the complete system. Each stand has built-in self-test features to insure correct operation.

RAIL AND TRUCK GET GIANT COOKER HOME

Shipping a 114-ft. pressure cooker takes some real ingenuity. Three railroad flatcars transported this 70-ton cigar-shaped unit from the Newport, Del., plant of Allied Steel Products Corporation to Port Kennedy, Pa. There two 50-ton cranes transferred it to trailer trucks and dollies for the trip to the Valley Forge plant of Ehret Magnesia Manufacturing Company. At the outskirts of the plant site, in a valley surrounded by park property, sides of hills were removed and shored to permit passage of the trucks. Two such units (another is to be installed shortly) will boost Ehret's production of high-temperature insulation.

Candy Wrapper Packs Auto Parts

What's good enough for candy is good enough for distributor contact points. That was the thinking at the Delco-Remy Division of General Motors (Anderson, Ind.) when it installed candy-wrapping machinery to package auto parts.

The theory was that packaging sets of contact points in heat-sealed laminated foil would be quick, safe, and commercially attractive. Delco-Remy was right on all counts. Packages for the assemblies are small (only 3 inches long with a 1½x¾-in. cross-section) and eye-catching in Delco's traditional orange, silver, black, and white boxes. Reception from dealers merchandising the points has been good. And, most important for plant operators, the new system has boosted quality by insulating the delicate points from corrosive moisture.

Delco added other features to the conventional machine to ensure continuous flow for the entire operation. These additions include a printing process for assembly instructions plus a stacker to insert 10 contact set assembly packages in a conventional pack can.

And there's another side of the story: Delco bought its new wrapping machine from an Anderson neighbor, The Lynch Corporation, makers of Wrap-O-Matic Machines.

How to Figure Training Payoff

There's a proven, six-part method for evaluating employee training in use at Temco Aircraft Corporation. It starts at the beginning of each course with a thorough test on the subject being covered. Then at the conclusion of the training the same test or an exact equivalent is given. Naturally an equivalent test is more effective and is used wherever possible.

During the course Temco never tells the students an evaluation is taking place. Nor do they know the tests at the beginning and end will be the same or similar. Here are details on the six-part plan:

1. On the basis of the test results at the start of a course, the class average is computed and entered on a worksheet. Using the class average and the highest possible score, the per cent of possible improvement (on the basis of 100) is determined. For example, if the class average at the beginning is 40 and total score possible is 100, possible improvement is 60.

2. After completion of the course, final test grades of the class are computed and averaged. Comparison of the two test averages gives a per cent of actual improvement. Thus if the class average started out at 40 and rose to 90, the improvement figure is 50. The improvement is tested statistically to insure soundness. But there is always the remote possibility a change in class averages could occur through chance alone. A standard statistical procedure tests the difference between per cents.

3. Next estimates of the number of hours the newly trained skills will be used are obtained from the line supervisors of the employees enrolled in the training class.

4. And finally an average minimum wage for the class is computed. Use of minimum figures helps keep evaluations realistic.

5. With this information, computation of estimated savings starts: The estimated number of hours the new skills will be used daily is multiplied first by the minimum wage, then by the actual per cent of improvement. Then this product is multiplied by the number of employees in the class. This gives estimated minimum daily savings to the company due to training results.

6. To obtain annual savings, the process is carried one step further. Daily savings are multiplied by the total working days in the year.

What do the evaluated results look like? Well, here are two:

• An evaluation of jig builders revealed a 19% increase in blueprint-reading skills. This represented annual net savings of more than

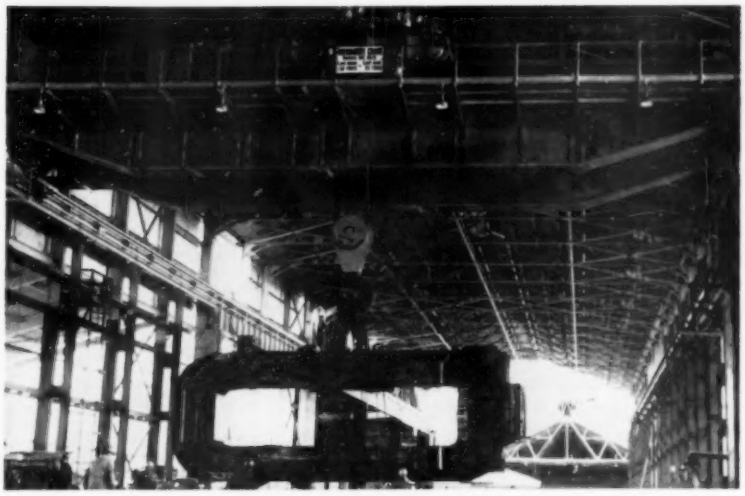
$41,000 after wages and expense of training were deducted.

• Another training program given inspection personnel revealed annual net savings of over $21,000. Although the class was small, Temco realized a 68% increase in job skills. And a follow-up on this group after six months revealed the group retained 91% of the job skills learned.

The sum of these two evaluations represents a $62,000 saving. In some industries 2.5% of total sales is considered a good net profit. On this basis, it would require $2,480,000 in sales to net a like amount of savings or profit.

The method has one important shortcoming: It's of no use in training that isn't related directly to measurable work.

Source: J. H. Norman, Statistical Analyst, Temco Aircraft Corporation, Dallas, Tex.



ALUMINUM CRANE HOISTS 200 TONS

A 200-ton housing for the world's largest aluminum hot rolling mill gets a lift from a huge aluminum crane (above) at the new Reynolds Metals Company Alloys Plant near Sheffield, Ala. This giant crane is over 50 tons lighter than a steel unit of equivalent strength—permits a corresponding saving in the cost of building supports and structural members. Rated at 150 tons capacity, the crane suffered only a momentary deflection of a fraction of an inch from the 200-ton load. Over-all width is 32 feet, span is 80 feet. In all, 14 aluminum cranes are in use at this plant. They're fabricated by Milwaukee Crane Division of Industrial Enterprises, Inc.

Punched Cards Speed Sand Mixing

This relatively small black box with all the control lights is Ford Motor Company's new punched-card system for mixing one-ton batches of core sand.

The system is in operation at the company's Dagenham (England) foundry. Here sand is mixed in three minutes to within 1% of specifications. All instructions for batching 10 basic core mixes plus variations are contained on the cards.

Ford figures new devices like this helped boost output per man-hour at the new 260,000-sq. ft. foundry to twice that of older facilities. The two men operating this sand-mixing complex feed cards into one of two electronic controllers. These simultaneously activate vibratory feeders to charge two weighing hoppers (one for sands and one for additives). With weighing completed, additives automatically dump into sand hopper. Meantime, the controller has automatically piped required amount of liquids (water and two oils) from storage to blow tanks.

Next step (set off by pressing a mix button) dumps sand and additives into a muller. As mixing begins, liquids are discharged into the muller, too. On completion the batch is automatically discharged to a turbo-drive system for pneumatic transfer at speeds up to 7000 fpm. to core blowing machines.

A control panel tells the operator which core machine is ready for a charge. Thus he can route the batch accordingly with a 14-way switch on the panel. Same panel also shows operator the mixes that are awaiting delivery, those progressing, and those being proportioned.

Ten minutes before a core-making station runs out of mix a light flashes on the control panel. Operator simply puts appropriate card into controller to continue cycle. There are 37 core-blowing machines at the new foundry, which has a 400-ton-per-day capacity.

Vacuums Up All the Solder

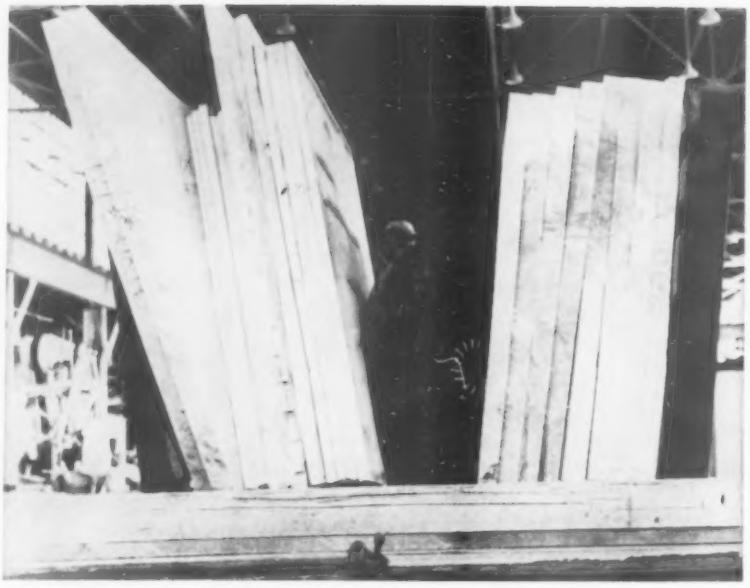
A slightly modified household vacuum cleaner provides Westinghouse's Air Arm Division with a quick, inexpensive way to unsolder connections. It's used during operator training as well as in production inspection. Insures 100% perfect soldering in electronic equipment for missiles. Philosophy of quality-control personnel, who keep close watch on performance records: "If it's questionable, it's a reject."

The Westinghouse vacuum cleaner

has added cylindrical wrapping of expanded metal to withstand industrial handling. Several feet of rubber tubing plug into the regular dust inlet through an adapter. Then a short piece of metal tubing is inserted in the business end of the hose held by the inspector.

During the removal operation a light touch of the soldering iron melts excess solder from the top of any questionable connection. Simultaneously the vacuum sucks it away without disturbing the connection itself. Operators and inspectors have 15-power magnifiers handy to see whether the joint has been properly "wetted." Same method is also used when removal or replacement of components is necessary. Minimum heat exposure cuts possibility of damaging printed circuit boards.

Source: T. Wos, Supervisor, Quality Engineering, Air Arm Division, Westinghouse Electric Corporation, Baltimore, Md.



DUNNAGE BAGS CUT SHIPPING DAMAGE 50%

Shipping these large marble slabs is no longer the handling nightmare it was in past years for the Vermont Marble Company (Proctor, Vt.). Reason is the "Brace-Fast" inflatable dunnage bags (center) made by New York Rubber Corporation (Beacon, N. Y.). They've reduced labor and materials cost for bracing as much as 75%, damage in transit by at least 50%. With the old wooden supports, damages from slipping during moves via rail ran up the handling bill for construction and decorative marble. New pneumatic dunnage supports are inflated with 5 pounds of pressure.

"Hot Box" Does a Better Job

This "hot box" came in mighty handy last winter for the Army Engineers stationed at Anchorage, Alaska. They had to remove 66,350 square feet of old asphalt floor tile from a headquarters building. And the safety supervisor vetoed the old blowtorch removal method because of burn and fire hazards.

Use of the "hot box" with its infra-red lamps turned out to be a time- and money-saving idea for the Army. And it's safe to operate, too. The aluminum box measures 24 inches long, has a 12-in.-square cross section. A battery of eight 250-watt infra-red heat lamps is clamped to the inside of the top panel. Total cost of the unit: $41.28.

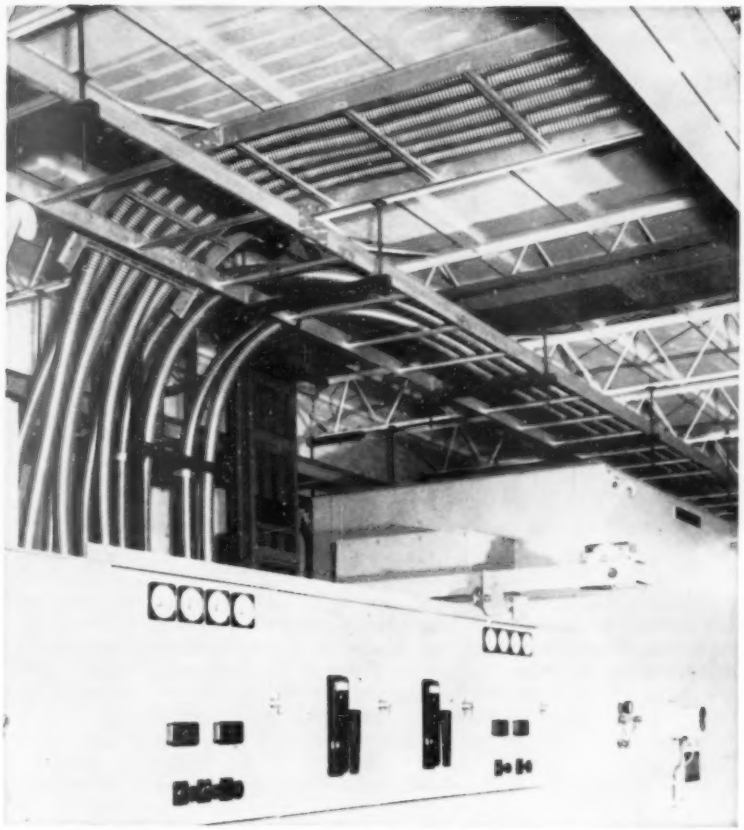
The box has no bottom so the heat from the lamps can get to the tile. With one side missing, maintenance men can pry the old tile loose. On the outside, an electric switch connected to 650 feet of extension cord permits free movement of the "hot box" even in long corridors. Army officials estimate the device will save over $4000 in maintenance costs on the headquarters building project alone during the next five years. Idea has been sent to headquarters for adoption by other units of the Army Engineers.

Key Club Sparks Togetherness

Want your supervisors to have a broad "company" orientation? So did Hupp Corporation of Cleveland. But the problem was made more complicated by the highly decentralized nature of company operations. Its major products, including air conditioners, heaters, missile and jet components, and automobile parts, are made at a number of different locations. And as Hupp expanded through the acquisition of other companies, newcomers knew little about Hupp except that it once made a dandy automobile, the Hupmobile.

Hupp's answer to the problem: a Key Club. It includes all members of management from president to foreman. Each member receives a certificate of membership and a directory of members. A monthly newsletter—*Key Club Notes*—is circulated to report news of all divisions. Thus Key Club members working in all divisions get a good over-all picture of the activities of other members. As a result every management man knows and feels he is a member of the corporation family.

Typical reports from *Key Club Notes:* Engineers hold joint cost-cutting conference; Key Club member wins JC award; division unveils new line at trade show; new infra-red Hupp-made heater installed in steel warehouse. The newsletter also reports new personnel assignments.



HIGH-UP SUBSTATIONS MEAN FLEXIBLE LAYOUT BELOW.

Planning an Electrical Future

Three years ago one thing became obvious at Cadillac's main assembly plant in Detroit: An inadequate electrical system was interfering with production. So management tackled the modernization in a way that makes sense. They set up long-range and short-range objectives. Sought help and advice from all available sources. Then started a step-by-step program to complete individual projects as production needs and available funds dictated.

Present average demand on electrical equipment is 22,000 kva. Plant load has climbed steadily from only 8000 kva. in 1946 and Cadillac engineers expect an additional boost of about 50% in the next five years. To accommodate this increase, they plan to have 72,000 kva. of transformer capacity eventually. The plant (much of it built in 1919) is a combination of single- and multi-story buildings separated by a heavily traveled street. It's Cadillac's all-important assembly facility. But its 3.5-million-sq.-ft. area also houses a foundry and several machine shop centers.

Thus some of the usual signs of distribution system inadequacy began to show up. And plans for more machines emphasized the need for greater capacity, flexibility, reliability, and safety. For each new machine tool installed, Cadillac paid an electrical penalty. In addition, some transformer and cable failures occurred.

In view of predicted growth, an economical, practical solution had to be found. To get the modernization started, Cadillac's plant engineering group set up a project team to study existing loads and forecast probable load growth in all sections of the plant. Maintenance crews under direction of the engineering team took voltage-drop and load-density meter readings on nearly every feeder. The local utility (Detroit Edison) and equipment manufacturers gave valuable help. G. M. staff specialists helped, too.

In six months the study team came up with a clear-cut picture of existing and potential troubles. Also worked out a plan to take care of today's electrical loads—and those anticipated for the next 10 years. Top management didn't need much convincing to see the wisdom of spending the money. But a few well-documented examples of the full cost of electrical failures clinched initial appropriations.

The proposal as accepted was broken down on a substation basis. (Included with each substation appropriation are building and auxiliaries, and all conduit, bus duct, and distribution panels fed from the substation.) Seventeen new 13,800/480-volt, 3000- and 4000-kva. unit substations will replace 4800/240-volt subs of 1500- to 3000-kva. rating. All motors and utilization equipment will operate on 440 volts, except for a few large 4800-volt units powering air compressors and other central services. And equipment (see photo) is being mounted on or under the roof so it will not interfere with any future layouts engineered by Cadillac's assembly-line planners.

System is designed to handle power and lighting loads that may reach 40 watts per square foot within 10 years. (Present loads average 15 to 25 watts per square foot for power plus another 5 watts for upgraded lighting.) Cadillac considers a straight radial system adequate. New 600-amp. bus duct on 44-ft. centers will provide plenty of power so machines can be shifted any time without having to make expensive electrical changes.

Distribution will remain as a Delta ungrounded system with ground detector lights mounted in the bus duct runs. Bus duct isn't being used in the foundry, where conductive dust might be a problem. Here flexible armored cable on ladder trays distributes power.

About one-fourth of the substations and load centers are already installed. Flexibility, better lighting, and safer operation in the new system are striking.

Source: Harry Hirt, General Electrical Foreman, Plant Engineering Group, Cadillac Motor Car Division, General Motors Corporation, Detroit.

Maintenance Men Do Every Craft Job

Maintenance workers at General Electric's Appliance Park have broad maintenance classifications instead of the usual craft specialties. This arrangement benefits employees and company alike. G-E's system has been running smoothly for over six years—ever since Appliance Park began operations back in 1952.

To the maintenance employee, a system of general classifications means a better pay scale and a chance to broaden his experience in many areas. As the worker develops a wide range of skills, he becomes more valuable, can therefore depend on steadier employment.

To the company, the system of general classifications means getting a job done more efficiently and at less cost. It eliminates costly disputes over who performs a certain job, creates a fluid, mobile maintenance operation that functions smoothly under any condition. This is especially true in emergency. And the improved worker morale resulting from fewer layoffs and rehirings benefits the company, too.

Under the usual system of trade classifications it might take five or more trades—or employees—to do a job that two employees could easily handle under the Appliance Park system. For example, to install a piece of machinery, a carpenter, electrician, millwright, plumber, and others would probably be needed under the skilled trades set-up. Only one trade could work at a time and each man would be confined to his particular skill. With a broad classification, fewer men, each with a varied background, handle the entire job—and faster, too.

For example, one recent job at Appliance Park called for fabrication and installation of extensive drip pans on a paint system. Four maintenance men—two with sheet-metal background and two with experience as millwrights—did the fabrication. Two men with carpentry backgrounds did the installation.

In many sections two-man maintenance crews service automatic production and conveyor equipment. These men are called on to do electrical, hydraulic, and mechanical work in connection with this maintenance operation. Similarly, in preventive maintenance, two men assigned to a specific area are responsible for doing the entire job. It doesn't matter whether plumbing, carpentry, or electric wiring is involved.

A special training program gives maintenance men an opportunity to become more proficient in various skills. This training helps employees and G-E realize the full benefits of broad maintenance classifications. And the training program gives maintenance supervisors a better way of evaluating individual capabilities and progress.

But the broad maintenance classifications haven't been entirely opposition-free at Appliance Park. Local union officials have made several attempts to break maintenance employees into traditional craft groups. When such attempts at craft organization are made, the company uses the opportunity to re-emphasize, through an intensive communication campaign, the benefits that are derived from the established system.

Source: R. A. Andersen, Superintendent, Central Maintenance, Appliance Park, General Electric Company, Louisville, Ky.

NEW CONTROL CONSOLE SPEEDS TESTING

This "building block" modular console consolidates four separate operations at Socony Mobil Oil Company's Paulsboro (N. J.) laboratory. Puts one operator within a few steps of any control along the 20-ft. unit. It's a custom-designed unit but uses as much standard hardware as possible. Formerly the five single-cylinder diesel engines used for performance tests were located at four different stations, had different control equipment and instrumentation, which in each case required more specialized operator training.

Lunches Served Supermarket Style

No long waiting line greets hungry lunchers at Carrier Corporation's new cafeteria. Waiting time, to be exact, is cut 70% by Carrier's supermarket approach.

Here's how the system works:

- As usual, employees get a tray as they enter the serving area.
- Then they get what they want by any route open, and in any sequence. From the entrance, desserts are on either side. Sandwiches, salads, rolls, and coffee are in a center island.

TACK-WELDING DOUBLES PRODUCTION

Machining semi-circular pieces can be difficult when tools cut the air. Electric Machinery Manufacturing Company (Minneapolis) found an easy way out that doubles production. It tack-welds two semi-circular brackets for large motors together, machines the single circular part. Operators use a turntable jig to align and tack-weld brackets, then move them to a boring machine for internal boring and facing of outer flange. Final cut at boring mill machines off the weld. Next the two absolutely concentric brackets move to smaller high-speed machines for drilling.

Hot dishes and soups are at a rear counter just outside the kitchen area.

• With a full tray the employee next goes to one of several checkout counters. Pays bill just as he would in the local supermarket.

• Relishes and condiments are on a centrally located table in the eating area readily available to anyone who wants them.

Conversion to supermarket service (from straightline cafeteria service) cost Carrier $5500. Idea isn't unique. Originally came from similar installations at Western Electric (Winston-Salem, N. C.) and Bell Laboratories (Murray Hill, N. J.). Benefits are three:

1. Compared with conventional cafeteria line system, cost of service and cleaning is reduced.

2. Customers are pleased with the service. Can enjoy meals more because they get food sooner.

3. Managers are pleased, too. Employees get back to work on time. And there's more time for them to eat and to relax during the lunch break.

Source: John Carroll, General Office Manager, Carrier Corporation, Syracuse, N. Y.

Brainstorms Solve Machining Puzzles

Brainstorming helps solve the more difficult machining problems that are brought to The Carborundum Company's Central Tool Plant (Niagara Falls, N. Y.). This facility doubles as the main machine and tool shop for various divisions of the company as well as a job shop for industry in general. In all, the plant has approximately 100 various sizes and types of machine tools. Thus it is able to handle the many difficult machining projects that smaller division shops can't.

One of the main suppliers of brain teasers is Carborundum's Research & Development Division. It poses problems on machining new materials like silicon carbide, aluminum oxide, boron carbide, and other extremely hard ceramic materials. And outside customers occasionally send in unusual types and shapes of material for grinding or machining to extremely close tolerances. Characteristics of some of the ceramic material forbid use of anything but diamond tools or grinding wheels. But machining methods often are limited from the start.

Carborundum turned to brainstorming as the best technique for solving these problems.

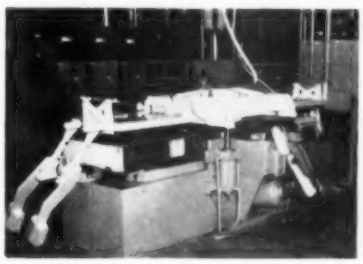
Participants in the sessions are the shop foreman (who acts as the moderator), his four assistants, a tool designer, and a stenographer (who records all ideas expressed). To promote orderly meetings and make them more productive brainstormers follow four rules:

1. Criticism is prohibited because it inhibits the free flow of ideas. "Killer phrases" reflecting a negative reaction to new ideas are also prohibited. "We've tried that before" and "That's a good idea, but . . ." are phrases that dam up the stream of ideas.

2. Free-wheeling is encouraged. Everyone at the meeting participates freely, with the understanding that any idea coming into his mind is to be contributed. The theory is that the more suggestions made, the better the chances of coming up with a good one. Sometimes one word in a seemingly useless idea triggers a good solution.

3. Combining and improving ideas is tried where possible. Carborundum calls this "hitch-hiking."

4. Meetings are limited to 30 minutes. Experience showed that long meetings were tiring and caused some people to lose interest. On the other hand a session that was too short didn't allow enough time for participants to scratch the surface of the problem.



This Busy Press Never Stands Still

That's because it has two lower traversing platens and one upper stationary one. Thus sizing and stress-relieving of aircraft parts is speeded up and simplified on this automatic,

titanium hot-forming press. Chance Vought Aircraft (Dallas) designed it for its own use. The one top platen exerts a 30-ton downward pressure on one of two 18x37-in. electrically heated dual traversing platens. And while one part is in the press, the operator loads or unloads the other lower platen.

No time lost. Operator just places part on the dies. Then automatic controls move dies and part into locking position for up to 60 minutes. A special high-temperature resistant alloy is used to heat titanium parts. And movable insulating pads help hold heat until parts move into press.

Rounds Up Employee Benefits

Question-and-answer descriptions of employee benefits help workers at Rome Cable Corporation (Rome, N. Y.) to know and understand plant policies. Material is assembled in a special looseleaf handbook, so revisions are easy. The handbook is divided into eight sections for quick reference checks.

Use of a different color for each section also makes collating easy for book assemblers and employees. Data are kept updated by replacing obsolete sheets with new ones. Here are the subjects covered by the eight sections:

1. General discussion covering such standard items as vacation policy, recreation, credit union, medical facilities, and the like.
2. Life insurance.
3. Weekly disability income.
4. Health benefits.
5. Employee dividend plan. (Rome Cable has a cash payment plan based on company earnings.)
6. Profit-sharing plan. This gives employees a share in American business through stocks and bonds.
7. Pension plan benefits.
8. Certificate folders to hold important papers.

The Rome manual covers all subjects in simple, easy-to-understand terms. Thus it encourages employees' wives to get into the picture and learn about the breadwinner's fringe benefits and employment rights. The looseleaf format was selected so that necessary revisions would be less expensive in the long run.

Automatic On-Off for These Lights

An automatic photocell control takes care of on-off switching as natural light varies in two new buildings of Hewlett-Packard Company (Palo Alto, Calif.). The control is just inside one of the sawtooth windows facing north.

On bright days work surfaces get more than 200 foot-candles of glareless natural light through windows in the plant's sawtooth roof. When natural light drops to 175 foot-candles, half of the 8-ft. fluorescent fixtures in each sawtooth section go on automatically. When outside light drops below 100 foot-candles, the rest of the lamps are illuminated. When sunshine returns, the process reverses. A built-in time delay with a half-hour cycle eliminates excessive switching when lighting levels change rapidly.

The photocell is the sensing unit of an electronic bridge. As natural light levels change beyond specified values, the bridge becomes unbalanced. This sets off a small motor to operate a cam. The cam in turn flips a mercury switch, lighting one bank of fluorescents. When the light level drops further, the cam once again turns, starting up the other bank of lights.

Tips on Cutting Your Painting Costs

Maybe a technically competent paint man can show your maintenance people a few tricks. By tackling maintenance painting the right way, you can save up to 40%, says Canadian Industries Ltd. (Montreal). Five major factors to be given special consideration when tackling any maintenance painting program are:

1. Surfaces to be painted.
2. Cleaning required. (What your company is prepared to do, whether job is physically possible.)
3. Time available for painting.
4. Painting skill of people assigned to the job.
5. Money your company has budgeted and is prepared to spend on maintenance painting.

Then let your company program include these points:

1. Expert appraisal of the requirements for painting structures and machinery.
2. Recommendations (in writing) for protecting and beautifying structures and machines.
3. A plan for implementation of the recommendations.
4. Adequate records to show what was done, when, at what cost.
5. Continuous and careful inspection to detect and remedy small defects before they develop into major maintenance problems.

Small Excavator Digs "Hole-in-One"

This digger hitched its way into the big hole and out again, via two cranes. It does an excavating job 60-ft. below ground level in a limited area. Hole is the beginning of the new 18-story California Bank building in Los Angeles.

The small, maneuverable machine minimized the danger of adjoining walls caving in. It cut and squared off footer walls, dropped the dirt on the excavation's rim. There a bulldozer pushed it within reach of a dragline bucket that hauled it up and out. The Gradall (Warner & Swasey Company, Cleveland) dug footings so accurately it eliminated need for forms. And before returning to surface, the digger shuttled concrete buckets around the floor of the excavation.

READERS SEND SHOP DATA . . .

. . . TO RECEIVERS, THUS GET . . .

Up-to-the-Minute Reports

Fast handling of control information gets high priority at Convair-Fort Worth. The method: three computer-produced daily reports that keep track of all in-process work at various fabrication centers.

It's a big job! Especially when you consider that the fabrication shop covers a 20-acre area. And approximately 20,000 orders representing some 600,000 detail parts are in the works at all times. On an average day 800 new orders enter the control system while the same number are completed. And during each day some 6000 orders move from one work center to another.

Even so, Convair's control system provides a complete and current record on order locations of in-process work. This way, the computer turns out timely reports. Cutoff for each day's reporting is midnight. This leaves enough time to produce the reports and circulate them to individual work areas before the start of the day shift on the following morning.

Fast work? You bet it is. But it's worth the effort, according to Convair's management. For proof, here's a list of advantages offered by this control procedure:

1. Highlights exceptions to the normal flow of parts through shop.
2. Encourages primarily push-type dispatching from fabrication centers themselves rather than pull-type from assembly.
3. Locates individual orders.
4. Points up lost shop orders immediately.
5. Provides accurate measurement of shop loads.
6. Reduces error frequency through mechanical operation.
7. Offers tremendous expansion potential.

DAILY REPORTS AT WORK

Reports tell work centers what jobs are needed next and where they stand on over-all scheduling. By making this information available to work-center managers, Convair's system concentrates on pushing orders through departments instead of having them pulled through by complaints from ensuing assembly operations. To show how this is accomplished, here's a brief description of the content and purpose of each report:

• Most important report is a daily listing of all jobs by work areas. Effective use of these data by shop management has done three things: reduced in-work backlogs, maintained a relatively level rate of order completion, cut man-hour costs per order.

The report actually tells each shop area what jobs to tackle first. It emphasizes the ones needed to relieve shortages and those that have been in the area too long. In addition, it identifies lost orders immediately. This is important because of the high order volume handled at Convair. Frequency of loss is small. But the total number of lost orders can become significant pretty soon. For example, one lost order per 1000 would result in 400 lost orders per month. With previous control methods it was hard to identify lost orders at all. Thus shortages invariably resulted.

• Second report is a list of jobs by areas needed to relieve shortages. Conscientious use of this information enables Convair to reduce the number of order expediters.

The using department and the location of every shortage relief order is listed along with the number of days it has been in its present location. Thus expediters know where to go for action and who's responsible for holdups.

• Third report covers progress activity on individual projects and over-all operations. The cost of compiling this one report manually would have exceeded $2000 a month. The report gives a daily breakdown on receipts, completions backlogs and schedule status.

In addition to the three reports described above, the computer compiles statistical data on time-and-order relationships. This information is valuable for load forecasting and shop scheduling analysis. The massing of this statistical data provides management with a solid basis for making decisions that used to be made on experience and intuition.

HANDLING INFORMATION

One big problem in setting up this system was to get all the information required for the daily reports to the computer center from the individual work areas. To do this Convair installed 59 card readers (left photo) throughout the shop. These readers are connected by cable to six tape punch receivers (right photo) in the computer area. Maximum distance between reader and receiver is 3000 feet.

As an order travels from station to station in the fabrication area, it's accompanied by a 3x7-in. card. Along the edge of this card, order serial number is punched in standard eight-channel code. On arrival in a work center, this card is inserted in the reader. The reader transmits a two-digit work-station identification plus order identification number. This information is recorded by the receivers on tape along with a time

YOU BE THE ARBITRATOR

THE CASE OF

The Unwanted Union

Out of the experience of the American Arbitration Association

Management called in a staff of detectives to investigate a weekend theft of a few hundred pounds of copper tubing from a stockroom. To start off, the investigators arranged interviews, on company time, with all employees who might have information about the missing tubing. These detectives had no authority to discipline anyone. Their function was only to gather the facts and report them to management.

Although no one questioned was accused of the crime, one employee demanded that a union representative be present during his interview. The company rejected his request. The union immediately filed a grievance. It contended that the contract clause calling for the presence of a union representative at grievance discussions applied here.

"Of course it applied," argued the union business agent. "The investigator's report might lead to action affecting a man's job. Besides, we don't like the way some of these investigators have been carrying on."

In answering, a company official said: "The grievance procedure provides for union participation. If anyone is hurt by the investigation, that will be the time to complain, and no one will bar the union. The investigators have the right to work in private. There is nothing in the contract to prevent this privacy and it deprives no one of his rights."

Eventually the case went to arbitration. Suppose you were the arbitrator. How would you rule?

For the actual decision turn to page 124

sequence code. A master digital clock provides time checks so the most recent location of each order can be determined.

When each order is initially issued, a punched card listing the part number, serial number, schedule dates, quantity ordered, and other significant information is prepared. This card represents the order in the work-in-process computer file. It is kept up to date from new information received on the tape. Tape data are entered on cards by a tape-to-card converter.

Source: R. P. Johnston, Assistant Chief of Manufacturing Control, Convair Division of General Dynamics Corp., Fort Worth, Tex.

Quiz Boosts Adult Learning

In the Twin Cities, Minneapolis and Saint Paul, business and professional groups have systematized their approach to adult education planning. For example, at Minneapolis-Honeywell Regulator Company the training director heads an educational expansion project. This project developed out of a meeting of personnel managers.

Under the plan a special quiz is mailed to each employee's home. Respondents identify themselves, list their training needs and interests. They also specify where and when they could attend classes. Another part of the survey is designed to locate teaching talent.

Twin City businesses have requested 40,000 copies of the questionnaire for distribution to their employees. For Honeywell, it's a highly profitable investment in the future of its workforce.

Now—Transformers Made of Aluminum

An all-aluminum transformer is no longer a daydream. At the 1959 midwinter AIEE meeting the Aluminum Company of America (Pittsburgh) displayed a 3750-kva. power transformer, a 500-kva. network transformer, and a 25-kva. distribution transformer. All three transformers are built (for commercial use) from aluminum—except for the core and insulation. The Moloney Electric Company of St. Louis built them.

Although Alcoa's own plants are the first customers for these units, aluminum enthusiasts believe that the metal's lighter weight, better heat-transfer properties, resistance to corrosion, lower maintenance costs, and potentially lower manufacturing costs will eventually bring about wide use.

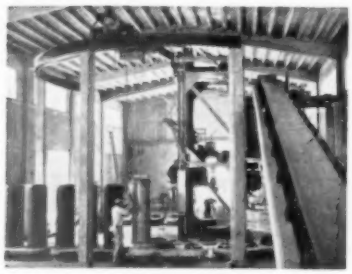
In the large power units, windings are aluminum wire. Heat radiation is accomplished by radiators fabricated from aluminum-extruded finned tubes. Heat-dissipating characteristics of new radiators give the unit about 60% greater thermal capacity than it was designed for.

The distribution transformer features aluminum-foil windings. Freedom from corrosion (and maintenance) and weight reduction are its big advantages. A corrugated aluminum tank for the network-type transformer will resist corrosion hazards present underground.

Fountain Collects Coins for Needy

Just before Christmas the delightful pool in the reception area at Convair's new Astronautics plant (San Diego) took on an added sparkle. What caused the extra shimmer? Coins, tossed in by employees. And when the pool was drained on Dec. 23, the money recovered was spent for toys and food for needy families in the area of the plant.

Plant departments caught the spirit. Many set up collection containers in their plant areas for later dumping in the pool. But folding money took a different route to the needy. It was turned over to the employee services department. (This pool is directly below the spiral ramp described in FACTORY's February Case Book, page 117.)

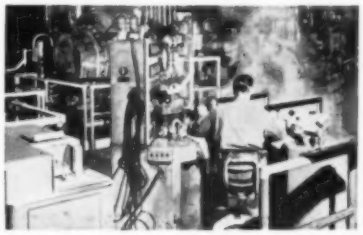


Crane Moves in Half Circle

Better handling and improved operator safety and productivity are big benefits of this semi-circular crane and hoist installation. It gives the Fountain Sand & Gravel Company (Pueblo, Colo.) a versatile unit that reduces costs of reinforced concrete pipe fabrication.

This unusual 6-ton crane-and-hoist arrangement makes a traditionally tough job look easy. The operator (center) is positioning a freshly poured mold on a movable cart for curing. After the cure cycle another operator, using the same hoist-and-crane unit, will lift the cover from the pipe section. Then he'll return the cover to the pouring station under the mixing chamber to get the next batch.

The hoist (Wright Hoist Division, American Chain & Cable Company, Inc., York, Pa.) has ample capacity to handle any size of concrete pipe manufactured by Fountain. Conveyor belt (right) keeps bin hoppers supplied with sand, gravel, and cement. A valve system provides water.



New Rolling Mill Speeds Production

This first electronically controlled rolling mill in the light-metal industry works aluminum billets into slabs. And the whole system runs by IBM card instruction at the Davenport (Iowa) works of the Aluminum Company of America.

Here are some highlights of Alcoa's system:

Mill speeds and roll openings for a 160-in. reversing mill are set by punched card. The breakdown mill (the widest in the industry) rolls 16-in. billets into slabs measuring 3 to 4 inches thick. A highly accurate, transistorized unit simplifies the rolling operation, increases efficiency.

The card-programed control system automatically supervises the movement of controls for working slabs to the right size. This way, the mill operator can give more attention to over-all operation of the mill. To work a billet, the operator feeds a single IBM card containing mill speed and roll setting for each pass of the rolling schedule into a card-reading unit. After the start button is pressed, the reader translates data into electrical impulses that position the rolls for the initial pass.

Simultaneously the card reader sets mill speed, indicates mill direction and pass number to the operator. Operator then completes the pass manually until the signal flashes that the final pass has been made. Different cards govern any of the standard size billets. Takes only a new card to correspond with the changed rolling schedule.

CASE BOOK CAPSULES

A 50% time saving in reproducing repetitious engineering drawings is realized at American Bosch Arma Corporation, Garden City, N. Y. Fotogram process cuts corners with paste-ups, overlays, and advanced photographic techniques.

Engineers' salaries are increasing an average of 6½% yearly, says a study by the Engineers Joint Council, New York City. In 1958 the median salary ranged from $6125 for one year's experience to $11,000 for 20 years' experience.

Wood laminating process turns out beams in 7 minutes against 4 to 24 hours needed by old methods. Developed by technologists at Washington State College's Industrial Research Division (Pullman).

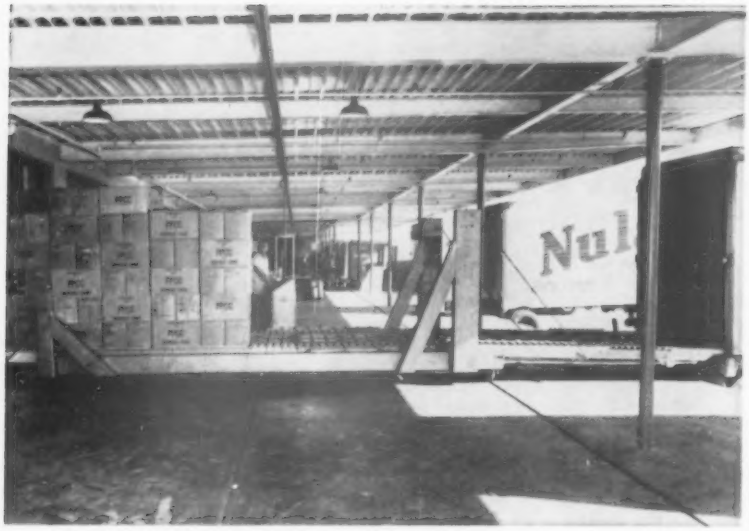
Smog reduction may result from experimental exhaust control system under test at General Motors Research Center, Detroit. System's manufacturer is Oxy-Catalyst, Inc. (Wayne, Pa.).

Metal-forming machine of 250 tons cuts engine-production time 50% for Marquardt Aircraft Company, Ogden, Utah. Spin-Forge (Hufford Corporation, El Segundo, Calif.) machines light, strong, close-tolerance parts in one or two operations.

Radiation process of Radiation Applications, Inc. (New York), improves bondability and ability of flurocarbon plastics to accept surface dyes. Said to be first low-cost process.

Operating five times faster than its predecessor, IBM's 7090 data processing system does 210,000 additions, reads or writes 3-million units per second. It's fully transistorized, says IBM's Data Processing Division (White Plains, N. Y.).

Two prototype tank cars with 16,000- and 20,000-gal. capacities —nearly double that of conventional cars—will transport chemicals, food, and petroleum products for Shippers' Car Line Division of ACF Industries, New York.



Van Unloaded in Four Minutes

Fresh eggs get a fast but gentle shuffle in this truck-unloading operation. Takes only four minutes to unload 432 cases of eggs from a refrigerated van with the electro-mechanical line haul device (photo). Then eggs move into refrigeration storage boxes at the new $2.8-million plant of Poultry Producers of Central California, at San Leandro. Formerly, the same operation took two men about 40 minutes.

When a loaded van arrives at the plant it's directed to the desired unloading location. Then the motor-driven dock carriage is positioned directly behind the open truck doors. When the front and rear drawbridges are mechanically lowered the 98-in.-wide carriage provides a conveyorized path from the van to the cold storage area.

To unload the van the carriage operator attaches a winch-operated line to a forward bulkhead in the truck. This pulls the entire load from the gravity conveyor on the truck's floor onto the motor-driven roller conveyor of the mobile carriage, which takes it into the plant.

With drawbridges at both ends of the carriage fully extended, the electro-mechanical unloading carriage is 27 feet long. The double-jointed drop at the right is 11 feet long, the shorter one at the left is only 2½ feet. The drawbridge construction was necessary so building columns wouldn't hamper travel of track-mounted carriage.

The control operator (center) rides with the mobile dock carriage, regulates all movements from the control panel. The carriage (designed by Food Machinery & Chemical Corporation, Riverside, Calif.) rides on three tracks, gets electrical power from the overhead traveling trolley. It travels along 120 feet of the 375-ft.-long dock.

Conveyor Runs Outside and In

Moving products from floor to floor is a problem in multi-story plants. But this outside conveyor duct provides a welcome solution at the Friedman-Marks Clothing Company (Richmond, Va.). The enclosed conveyor carries coats through an exit carved in the upper floor sidewall, down a 45-deg. incline, and into a window entrance in the floor below.

Benefits from the system—now in its second year of successful operation—are four-fold. Operators work more efficiently in less crowded areas. Time and space are saved by elimination of caster-mounted racks. Building elevator is free for other traffic. And handling labor is cut by a man and a half.

The conveyor used is a one-way device with no return loop. It's called Monoflo (M-H Standards Corporation, Jersey City, N. J.). With the unit's exposed rotating worm the operators can dispose of garments in one easy motion with hangers acting as the carriers. It was Friedman-Marks' own idea to install the Monoflo conveyor, even though the excessive vertical incline posed a problem. The conveyor operates continuously, requires no operator supervision or controls. And it discharges its load directly onto a conventional slick rail storage rack.

Pays up to 85% of Education Costs

An educational refund program has enabled 2500 employees of The Garrett Corporation (Los Angeles) to complete brain-twisting subjects ranging from glass blowing to advanced nuclear physics. Introduced six years ago, it helps the company encourage employee enrollment in a variety of courses. There's no limit placed on the number of courses each employee can take.

The refund program covers 85% of the costs if the employee's expense for tuition, lab fees, and textbooks is under $12.50. This benefits employees attending classes with negligible tuition costs. If costs exceed $12.50, the Garrett plan reimburses the employee for 85% of lab fees and tuition (but not books) up to $75.

Usual procedure for an employee to receive reimbursement is to have his application approved by the company education committee within 10 days after enrolling in a course. Then if he receives a grade of A, B, C, or the equivalent, the plan benefits are paid. Employees of the company's manufacturing divisions in Los Angeles and Phoenix take advantage of evening courses offered

by such schools and colleges as UCLA, USC, Loyola, Los Angeles-Trade-Technical Junior College, Arizona State College, and Phoenix Union High School.

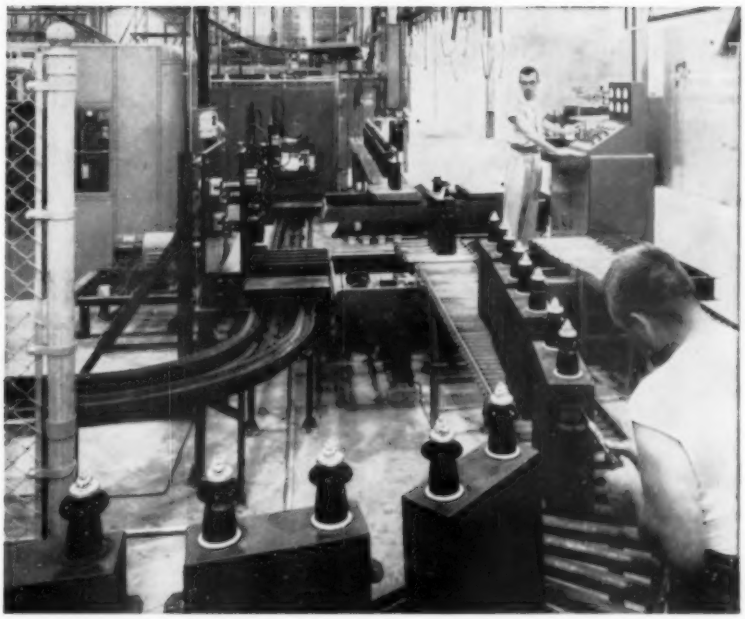
Garrett believes this employee program produces a more skilled and productive employee. And employees gain the benefits of higher wages for their new skills.

High-Precision, High-Speed Monster

Thanks to the ingenious machine in the photo, Delta wings on Convair's F-102A supersonic interceptor are interchangeable. At the San Diego plant it trims critical leading edges of a pair of wings, finishes all holes for attaching wing sections to the fuselage, then bores and reams the main landing-gear attachment holes. Old hand-routing method couldn't produce required precision for interchangeability, cost an extra 300 man-hours per wing.

Once a pair of wings is mounted vertically, pneumatic milling spindles with cam followers trim the wing edges. The mills ride on a hardened overhead tramway. Landing-gear holes are drilled and reamed by units moved into position through the landing-gear openings. Fuselage hole reaming is done by drills mounted in the holes originally used to position wings in the fixture.

Reprints of the Plant Operating Case Book are available. Price 50¢. For quantity prices write Reader Service Department, FACTORY, 330 W. 42nd St., New York 36.



CONTROL TESTS CAPACITORS, CORRECTS MISTAKES

A new chapter for the automatic control of complex processes is being written by Opcon, an adaptive control. It's shown above automatically testing large capacitors by balancing a bridge circuit at Westinghouse Electric Corporation's new Bloomington, Ind., switchgear plant. Developed by Westinghouse engineers, the new system is designed to control processes where the effect of changing one of a group of variables is too complex to be predictable. The control senses output, strives for the optimum. As inputs are adjusted in successive steps, those showing improvement are repeated and the unsuccessful ones are discarded.

Hard-Facing Goes Automatic

The rate of wear on pipe couplings is high during the drilling of deep oil wells. That was the necessity that mothered the invention of hard-facing the couplings with tungsten-carbide particles at National Supply Company's Toledo plant. Now the procedure is performed automatically on a production-line basis.

A gas-shielded, surface-melting arc and a metered flow of tungsten-carbide particles into the molten pool behind the arc on the rotating joint (photo) provide the solution. A non-consumable electrode melts the surface of the tool joint to a depth of about ⅛ inch.

There are three advantages that the new process has over the old method (in which an open arc did the job with a coiled tubular tungsten-particle rod):

- Overlay carbide is now uniformly distributed for more effective wear resistance. This almost eliminates spalling and cracking.
- Only tungsten carbide is deposited by the inert gas process because there's no steel to melt into tool joints.
- A complex grooving operation that was necessary in the open-arc process is eliminated.

In the new set-up tool joints move through an induction heater that raises their temperature to almost 800 F. The operator then clamps a preheated tool joint in a three-jaw lathe chuck, aligns the non-consumable thoriated tungsten electrode, and presses a start button to strike the arc.

Inspection Rate Zooms

Boosting the inspection rate on intricate code rods from one or two to as many as 20 per shift was a real cost-cutter for International Business Machines Corporation, Endicott, N. Y. How was it done? By utilizing optical gaging.

The ⅛-in. stainless steel code rod is the heart of IBM's 720A high-speed printer. It helps the printer translate data directly from an electronic data-processing unit or magnetic tape to a printed document at a rate of 60,000 characters per minute. Each rod is capable of forming 55 characters. Has a total of 1118 drilled in various combinations at eight different intervals around, and in seven straight rows down its 8-in. length. Lateral and angular tolerance of holes is a critical 0.0015 inch. This must be maintained for code rods to print the correct characters.

Originally IBM used conventional-height gages and functional testing to check the size and location of the rod's 1118 holes. But, as production demands increased, this method proved too slow and costly. Thus IBM turned to optical gaging. This projects a magnified image of the part being inspected on a translucent screen for comparison with a master pattern.

But the problem wasn't solved that easily. Because of the complex hole patterns, operators had difficulty in correctly indexing and aligning the code rod on the projector screen. At first charts were used to show correct hole positions and groupings. This resulted in time losses and eye fatigue. Next hole pattern instructions were put on a tape so the operator could listen to them with headphones while concentrating on the projector screen. This increased the inspection rates to 12 code rods per shift—but was still not satisfactory.

Finally IBM decided to place a master code rod in a staging fixture (similar to a lathe chuck) alongside the rod being inspected. This arrangement projects surface images of both rods side-by-side on the screen. Thus as the operator indexes the two rods, like hole groupings of both always match. And with a chart gage superimposed on the screen the operator can inspect tolerances at the same time.

Contributions from readers reporting experiences will be welcomed. No need for fancy writing; just a clear, concise statement of facts. If you have photos or drawings, be sure to include. We'll edit for the Case Book. Contributions accepted will be paid for at time of publication. Address: Case Book Editor, FACTORY, 330 West 42nd St., New York 36.

YOU BE THE ARBITRATOR

Continued from page 120

The award—The grievance was denied, without prejudice to the right to process a new grievance if action that was deemed unjustified should be taken against an employee. The arbitrator said the issue was not whether the union should have the right to sit in on investigations, but whether it has the right. Under the existing contract or past practice, he found nothing that in any way curtailed the company's right to proceed as stated with the investigation.

Caution: The award in this case is not an indication of how other arbitrators might rule in other apparently similar cases. Arbitrators do not follow precedents. Each case is decided on the basis of the particular history, contract, testimony, and other facts involved.

Low-Cost Pallets for Heavy Loads

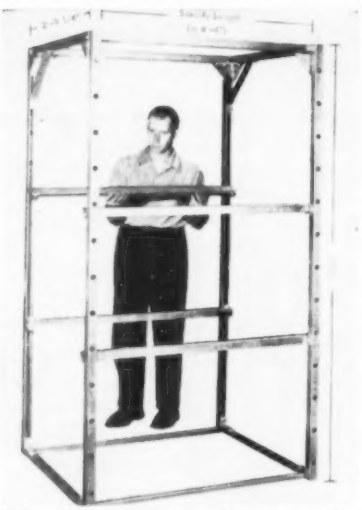
Could you use a low-cost, expendable pallet that can carry over 3000 pounds? The Calaveras Cement Company (San Francisco) has developed one that handles from 31 to 36 sacks of cement. And the pallets cost less than $1 each.

Extremely light in construction, the 5-lb. pallets are made of wood-reinforced corrugated paper board, are adaptable to any industry that uses sacks, bags, or cartons. Standard forks of 36 inches or longer, inserted into two specially constructed channels, can easily handle the units. Construction of pallets also permits three-high stacking of loads of cement bags.

For more about these items, circle item numbers on Reader Service Card next to back cover.

154—Dragline Cart has pressure-sensitive bumper. Safely and automatically permits switching from one tow line to another, dispatching truck from position to position, stopping or gathering truck on moving conveyor, engaging truck to tow line. *S. Handling Systems, Inc.*

155—Soft Slings of nylon webbing, for handling polished, painted, coated, or delicate items, avoid marring, marking, or scratching. Come in endless (or grommet), double eye, reverse eye types; varying widths, lengths; marked with safe working load. *Pennsylvania Sling Co.*



156—Storage Rack, adjustable without tools, holds 2000 lb. per shelf or pallet. Corrosion-proof galvanized finish. Stands 7-ft. high, 2-ft. 9¼-in. deep, with widths available to 4-ft. 4-in. Front or back loading; lightweight; low cost; rapid assembly. *Versabar Corp.*

Turn the page

Picture of worker saving money

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Put them in your washrooms on a trial basis and see how you save. Your local janitorial supplier or sanitary paper distributor can help you . . . there is no charge for the dispensers. For more information send in the coupon below.

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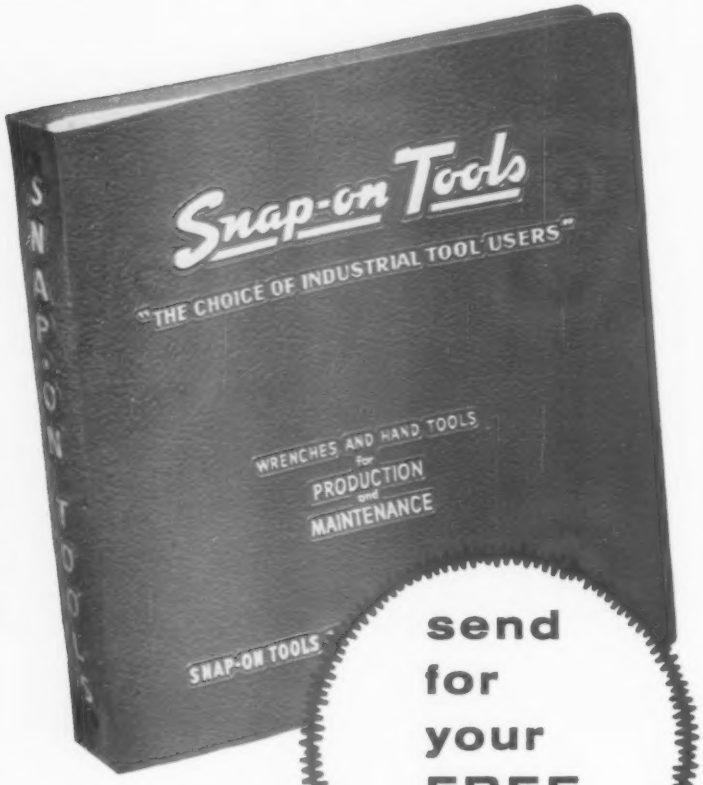

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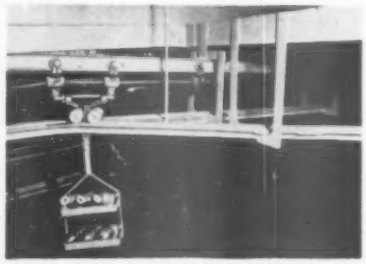
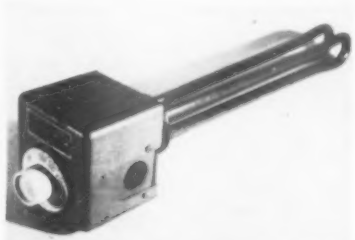
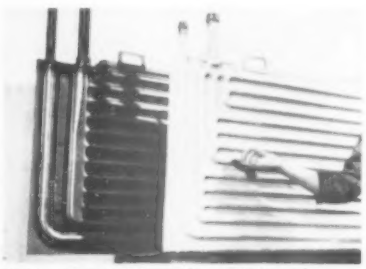


157—Power-and-Free Attachment for overhead Cable-Link trolley system permits switching trolleys from one conveyor to another or—by a simple mechanical switch—into a free, gravity system. Slight modifications convert other systems. *Dearborn Fabricating & Engineering.*



158—Immersion Heaters, thermostatically controlled, heat water or oil solutions in humidifiers, quench tanks, oil preheaters, etc. Over-all length from 15¼- to 45¾-in., with 2-in. headers. Water-temperature range setting 80 to 220F.; oil 150 to 550F. *General Electric Co.*



159—Heat Transfer Unit of new "Platecoil" style improves steam circulation in header-type design. Sizes to 22¼-in. wide and to 143-in. long., with connections at top or side. Provides faster heat-up, better distribution, closer temperature control. *Tranter Mfg., Inc.*

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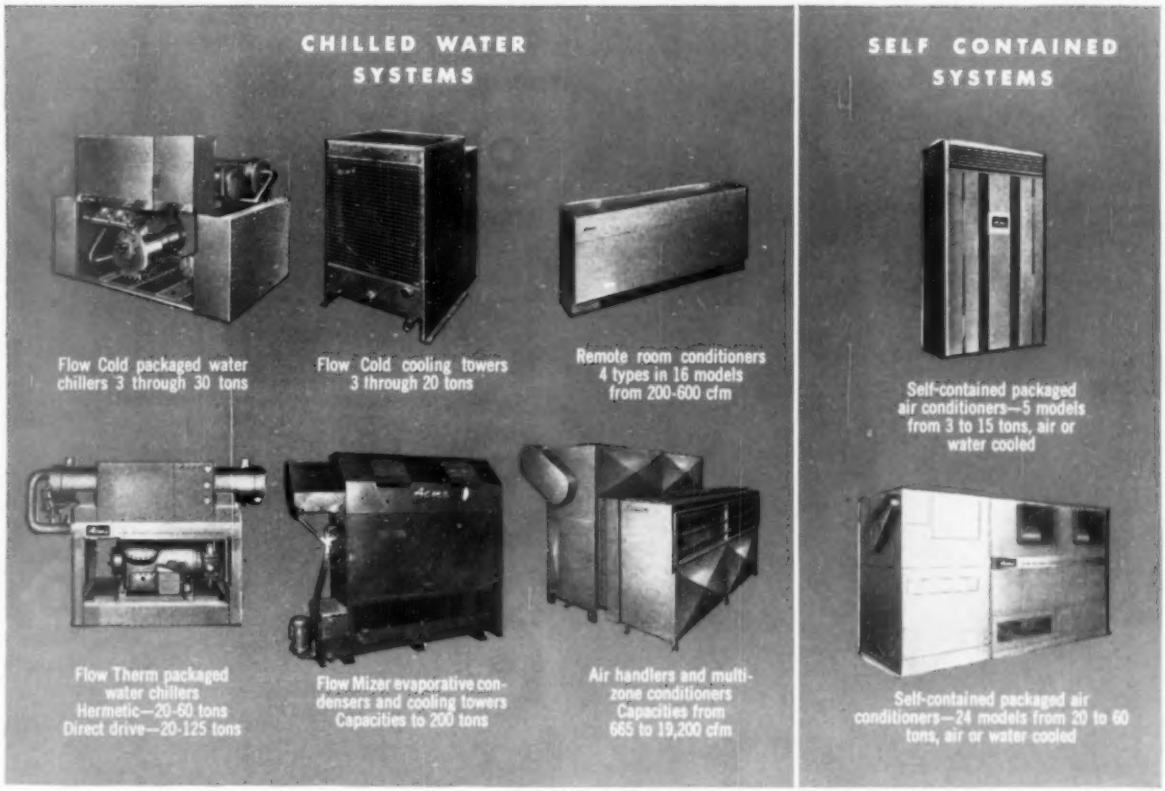
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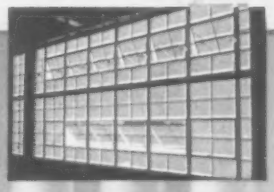

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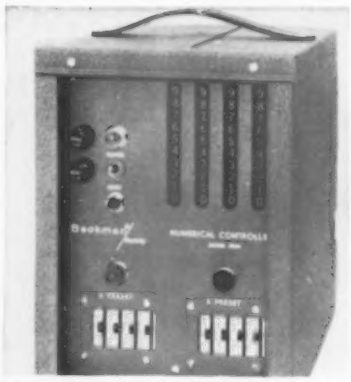
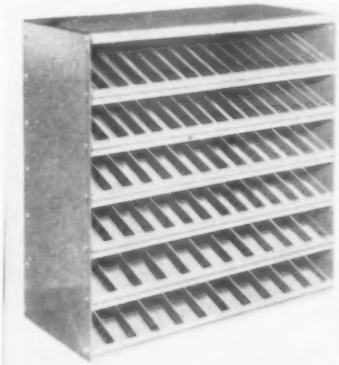


160—Counter-Controller, in dust-proof housing, counts 100,000 events at maximum rate of 5000 per sec. Controls coilwinding, cutting to length, batching items, metal forming, testing, sorting. Unaffected by voltage fluctuations. Easy to install. *Beckman Instruments, Inc.*

161—Plastic Pipe Fittings with grooved ends are for quick-jointing plastic pipe with Victaulic mechanical couplings. Three materials, sizes from 1½- to 8-in., in elbows, tees, crosses, 45F. laterals, reducers, caps, flanged adapter nipples. *Victaulic Co. of America.*



162—Tool Storage Cabinet has 78 compartments in 3 widths for drills, reamers, taps, etc. Compartments are 2 3/16-, 2 9/16-, and 3-in. wide. In gray or green, steel cabinet measures 33¼x16½x34⅝-in. Turned-up bin fronts form label holders. *Alan Wood Steel Co.*

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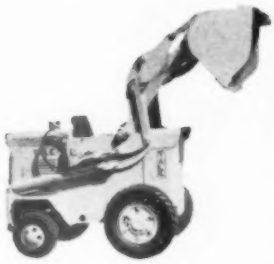
10 hours' work in an 8-hour shift!

That's the production advantage of the Yale Industrial Tractor Shovel



Here are the features that make the Yale Industrial Tractor Shovel outstanding...

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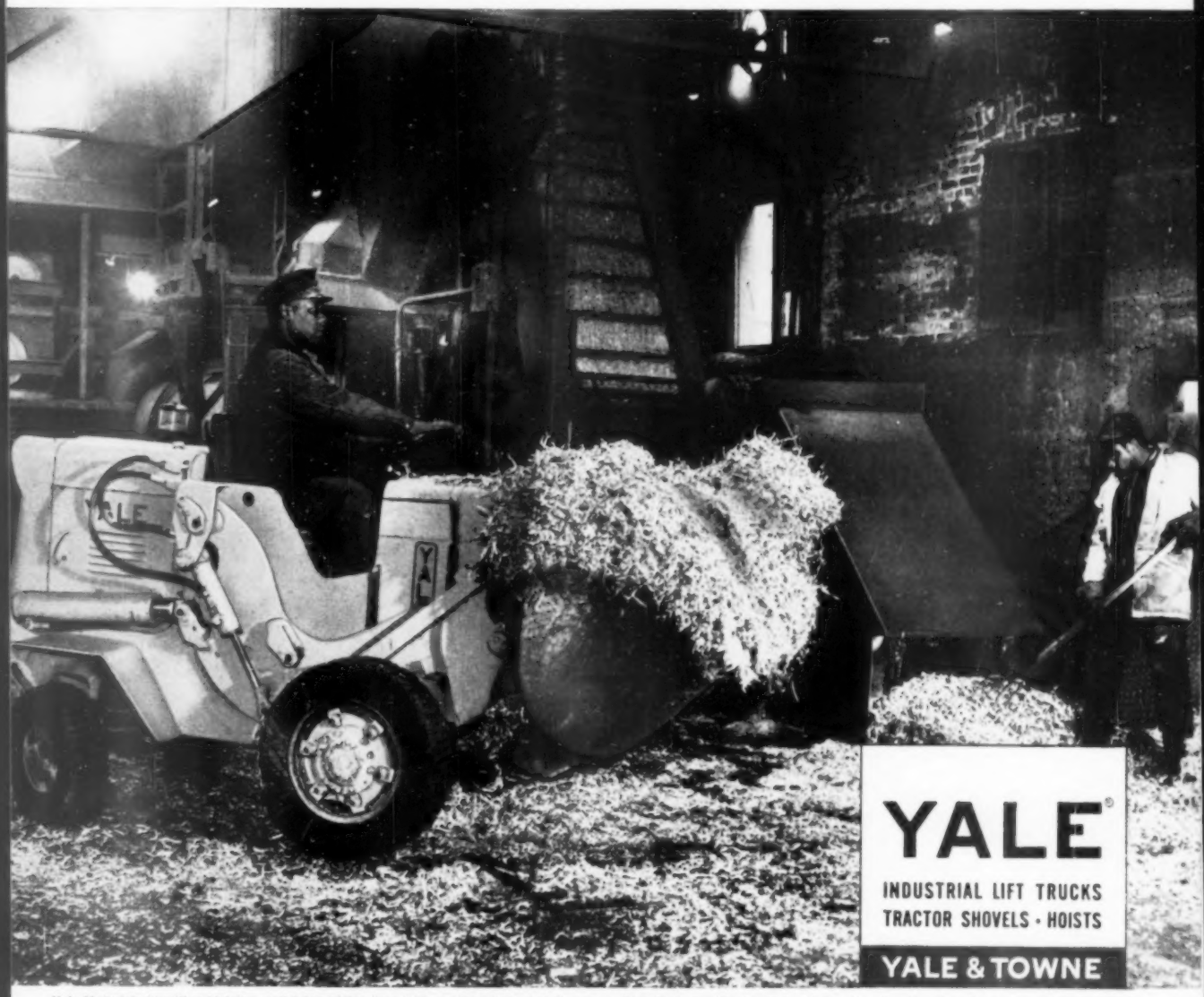
PERFORMANCE! 2500 lb. carry capacity. Exclusive 45° bucket tipback permits faster loading and lowest carry position for faster transport with minimum spillage. 6' dumping clearance permits dumping into bins and hoppers out of range of other—even larger—tractor shovels. Shortest turning radius, too—only 73".

SAFETY! Safety-curve lifting mechanism members never rise alongside the operator. Front and back working lights provide extra security.

DEPENDABILITY! Rugged design • sealed brakes and electrical system • protected steering linkage • 10 ply tires—all adds up to more work at less cost...more production hours. Full range of buckets and attachments available.

Field applications prove that these features add up to 25% more work per hour—10 hours' work in an 8-hour shift. For a demonstration in your plant or complete information contact your Yale representative. Or write The Yale & Towne Manufacturing Company, Yale Materials Handling Division, Dept. YT 2-H.



Yale Materials Handling Division, a division of The Yale & Towne Manufacturing Company. **Manufacturing Plants:** Philadelphia, Pa., San Leandro, Calif., Forrest City, Ark.
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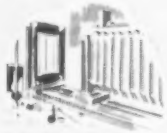

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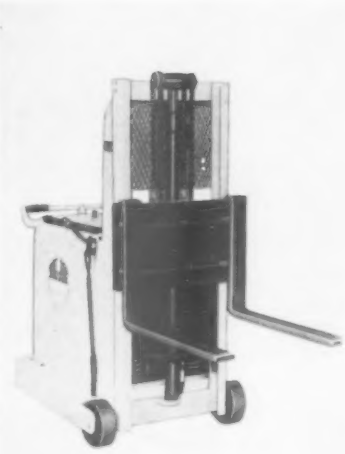
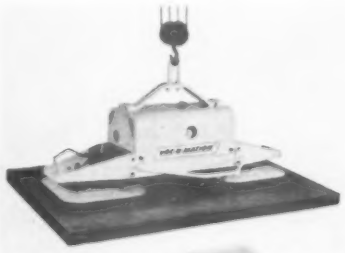


163—Lift Truck, one of the lightest in its class, handles double-faced pallets, wire coils, tote pans, rolls, dies, jigs, carboys. Works easily under low ceilings; lifts loads to 90-in. high. Counter-balancer permits lifting from 1- to 1000-lb. *Big Joe Mfg. Co.*

164—Spherical Roller Bearings feature high capacity and excellent performance under severe conditions of high eccentricity and speed. Available in 22200 and 22300 series; bore sizes from 1.5748 in. to 11.0236 in. with dynamic load ratings to 288,000 lb. *Link-Belt Co.*



165—Sheet Lifter for moving steel and non-ferrous plates, has two 20-sq.-in. vacuum cups, each with 4000-lb. lifting power. Twin-cylinder pump maintains constant vacuum reserve in tank; prevents load from dropping in case of power failure. *F. J. Littell Machine Co.*

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PAYLOADER® maneuverability

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That's one of the significant comments of J. T. Williams, plant manager and Edwin Daugs, "PAYLOADER" operator, of Grede Foundries Inc. at Reedsburg, Wis., concerning their model H-25. This Milwaukee company, with seven plants in the Midwest, has enjoyed many years of profitable experience with "PAYLOADER" tractor-shovel use in their steel, gray iron, ductile iron and alloy iron casting operations.

The Reedsburg product is ductile iron and its Model H-25 has important duties there day and night. It breaks the molds on the floor, then picks up sand and castings and delivers them to the shakeout. It takes used sand to the muller and delivers 30-35 loads of reconditioned sand per hour to the molding stations . . . also hauls limestone and coke.

Power-steering is one of the many features of the new H-25 "PAYLOADER" that makes it more productive. Its 2,500 lbs. carry capacity is 25 to 50% more than has heretofore been available in a 6-ft.-turning-radius tractor-shovel. It has power-shift transmission for fast, easy shuttling and maneuvering and including exclusive two-speed ranges in reverse. Power-transfer differential is another exclusive in its size class — a feature that transfers more power to the other drive wheel when one of them gets on slippery or loose footing. It reduces wheel-spinning, time-wasting inaction.

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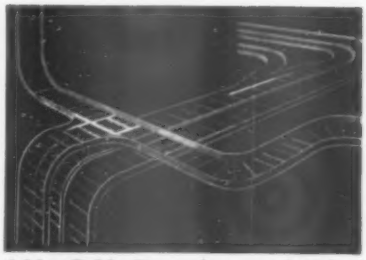
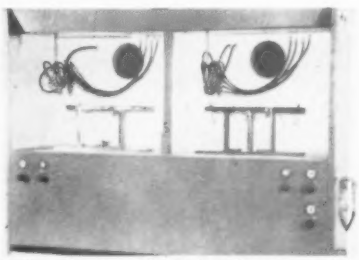


166—Cable Trays feature electrical continuity with large current-carrying capacity, insure personnel and equipment safety in case of cable fault. For heavy loads of small-power and control cables. Come in 6- to 24-in. widths, 12 and 24-ft. lengths. *Husky Products Co.*

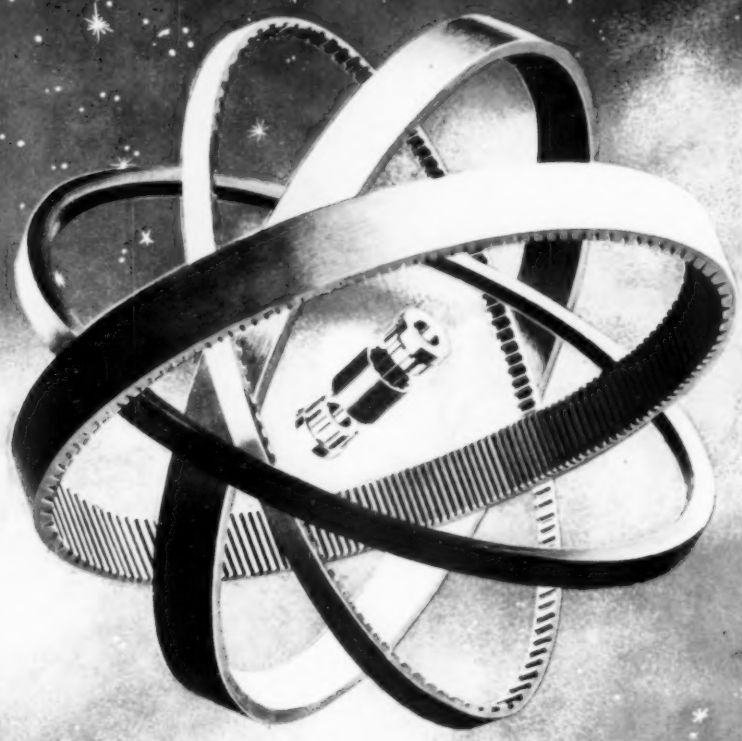
167—Cleaning Gun uses varsol, kerosene, naphtha, and other solvents in aircraft, automotive, industrial engine fields. Comes with 10-in. straight or 45-deg.-angle extension; trigger control operates air and cleaning fluid. Pressure tank or gravity feed. *Binks Mfg. Co.*

168—Revolving Joint, in ¼- to 3-in. sizes, connects stationary supply pipe and revolving cylinder. Handles steam to 150 psi., water, air, vacuum, industrial fluids and gases to 250 psi. Mechanical seal automatically adjusts to fluid pressure. *Perfecting Service Co.*



169—Automatic Paint Sprayer with double vertical fixture permits one operator to do work of two hand-sprayers. Finishes 1 to 3 surfaces of oval or rectangular-shaped pieces in varying lengths. Operator loads one side, while other side paints. *Conforming Matrix Corp.*

Turn to page 137



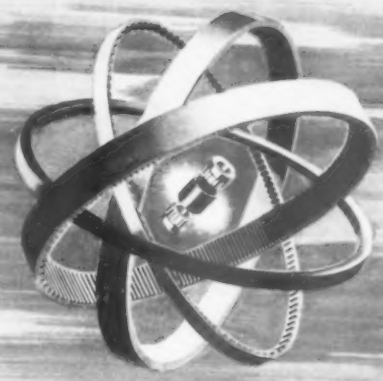
POWER UNLIMITED

WITH BELTS OF POWER BY US RUBBER

The only complete line
of Transmission Belts

US RUBBER

TRANSMISSION BELTS

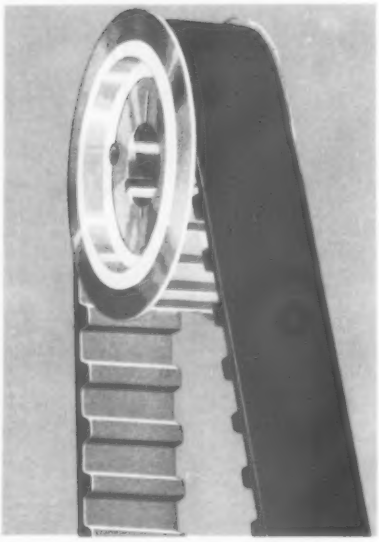


Leading economists and industrialists predict that, by 1965, production of the nation's goods will be up 40%, caused partly by population increase, greater spending power and increased living standards.

Manufacturers, to compete in this market of the future, must take advantage of every new mechanical aid, get the maximum rated capacity from each motor, and transmit that power with greatest efficiency. That's why Industry, in girding for Power Unlimited, looks to "U. S." for Belts of Power.

Those who gird for Power Unlimited, will be richly rewarded in this growing market.

U. S. *PowerGrip* "TIMING" BELTS IN TOP DEMAND IN A GROWING MARKET



The U.S. PowerGrip "Timing"® Belt is one belt that delivers POSITIVE drive, non-slip performance all the time. During the eight years since it was patented by "U. S." this "Timing" belt with teeth has been popularly referred to as the "T" belt.

So indispensable has this "Timing" belt become that thousands of plants, girding for power and automation, are using the T belt. It not only gives non-slip performance, it will never stretch and will outlast all others. Besides, it requires no lubrication, no maintenance. And since this belt requires virtually no initial tension at installation, think of how this prolongs bearing life.

Your U. S. Power Transmission Distributor carries a full line of stock sizes, has the experience and engineering know-how to help you convert quickly and easily.

THE NEW, ALL-NEW U. S. ROYAL V-BELT

NEW, *all new* because its cords are treated by an entirely new automation process. Every cord is impregnated with latex in every fiber (not merely surface-coated). Every cord is then built into the belt under tension, with error-proof electronic precision to insure that each will pull its uniform share of the load.

NEW, *all new* because the belt is cured by a unique method of molding developed by U. S. Rubber. Consequently there can be no inner or outer imperfections, no harsh bumps. This means smooth-running performance, long belt life.

NEW, *all new* because the new covers of new fabrics become a homogeneous blend through new molding techniques. This results in longer belt life by increasing wear resistance.

NEW, *all new* because this new method of construction results in strength to spare...a reserve of strength which combined with vibration-free running, results in greater drive efficiency.

NEW, *all new* because U. S. Royal V-belts feature perfect matchability. Born matched, they stay matched.

PRESS-CURED V-BELTS

The U. S. Royal® line, of course, includes sizes larger than 180". These giant size V-Belts are built by a new "U. S." process that practically eliminates length variation and greatly reduces belt matching problems.

U. S. ROYAL FLAT BELTS

U. S. Royal flat belts are built for the rough, tough shock loads. They feature a specially woven duck for top strength and tenacity with top-quality friction between plies. Available for small-pulley high-speed work or for use on heavy-powered drives.

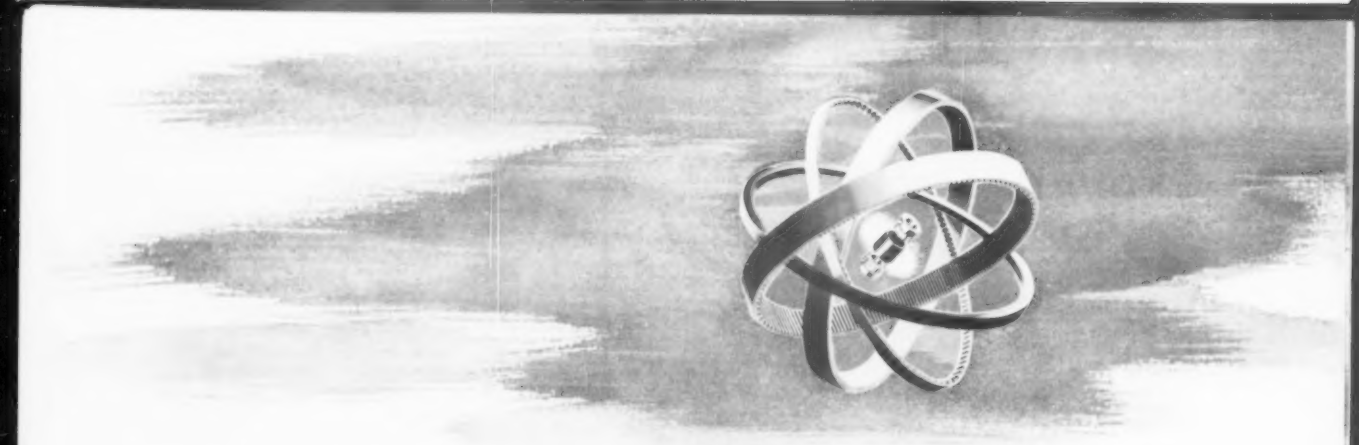
The U. S. Royal Jr. Transmission Belt is for small machine drives and in textile mills. It's a sturdy, muscular belt that withstands frequent shifting, runs steadily and true at high speed on cross drives.

U. S. Rainbow® Transmission Belt is a famous money-saver and general purpose belt. Special friction between plies assures remarkably long flexing and aging life. Special friction surface provides superior traction on pulleys.

U. S. ROYAL CORD ENDLESS BELTS

Designed for work on open, serpentine and reverse drives. The cord plies are laid in a continuous length, making a truly endless construction with exceptionally low stretch.

U. S. Speedage Kord® Endless Belts are for really high-speed service—up to 10,000 f.p.m. Thin enough to operate over pulleys as small as ½" in diameter. And Speedage is also the right belt when it's a question of long wear, shock absorption, infrequent take-up and oil exposure. No seams, splices or laps to cause vibration.

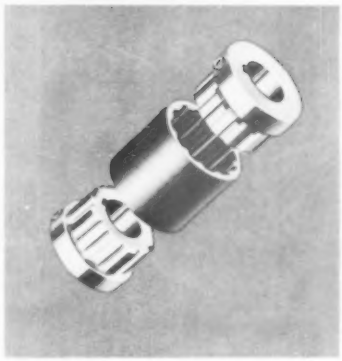


THE NEW LOW-COST FLEXIBLE COUPLING

The most versatile coupling ever produced—compensates for angular, axial and lateral misalignment.

This coupling of small diameter and high torque capacity has every possible sales advantage. It makes alignment by eye easy, because its unique design permits greater axial misalignment and automatically compensates for lateral thrust.

The PowerGrip Flexible Coupling provides torsional resilience by angular displacement and insulates both vibrationally and electronically (no metal-to-metal contact). Its smooth exterior provides maximum safety. Operates silently, resists grease and acids, requires no lubrication.



GIRD NOW FOR POWER UNLIMITED

Wherever wheels turn on production machines, power tools and appliances, "U. S." Transmission Belts are at work. To guarantee maximum efficiency to any power drive operation, utilize the help of your "U. S." Power Transmission Engineer. He is available for your consultation and training.

THE ONLY COMPLETE LINE OF TRANSMISSION BELTS

"U. S." Power Transmission Distributors are located throughout America. They in turn are served by our strategically located warehouse branches, with headquarters in Rockefeller Center, New York 20, N. Y. In Canada, Dominion Rubber Co., Ltd.

US RUBBER

Mechanical Goods Division

United States Rubber

WORLD'S LARGEST MANUFACTURER OF INDUSTRIAL RUBBER PRODUCTS

Rockefeller Center, New York 20, N.Y. In Canada: Dominion Rubber Company, Ltd.

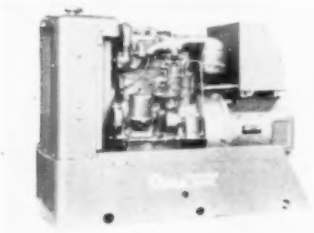
FACTORY / EQUIPMENT NEWS

Begins on page 88

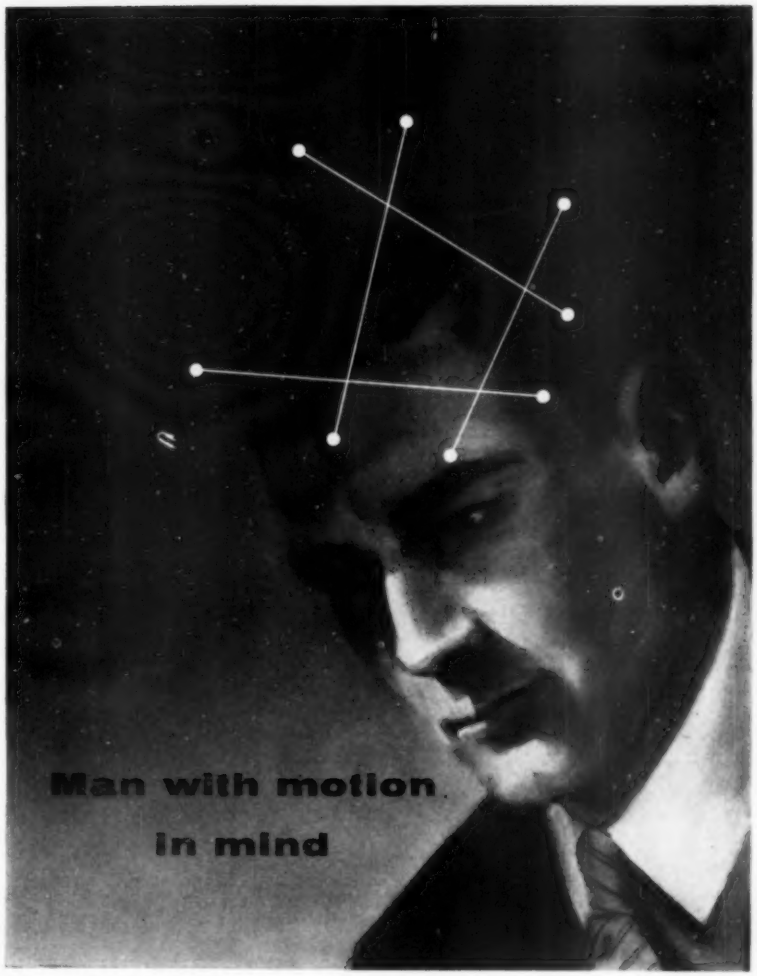
For more about these items, circle item numbers on Reader Service Card next to back cover.

170—Paint Handling Pump is portable, fits standard 5-gal. pail. For maintenance painters, decorating contractors, and plants needing quick color changes for light production painting. Operates on 3 to 6 cfm. of air; output to 1 gpm.; 2:1 delivery ratio. *Binks Mfg. Co.*

171—Roadway Electric Switch, using steel rod molded into rubber contactor strip, needs over 200-lb. pressure to activate. Low-cost, easily installed. No junction box. Announces vehicle arrivals, actuates mechanical doors, turns on both warning lights and yard lights. *Nu-Way Signal Co.*



172—Electric Generating Plant, water-cooled, diesel-driven, comes in 10,000 or 15,000-watt a-c sizes, 60- and 50-cycle, up to 460 volts. Useful as continuous, dependable electrical power source, where low-volatile diesel fuel is preferred to gasoline. *D. W. Onan & Son, Inc.*



"The Man from Logan" is challenged by the problem of *motion* every working day. Materials handling encompasses the total aspect of motion; direction, speed, and timing of materials moved over a conveying system. "The Man from Logan" is equipped to diagnose and design the *exact* system to fit the demanding needs of small and large users.

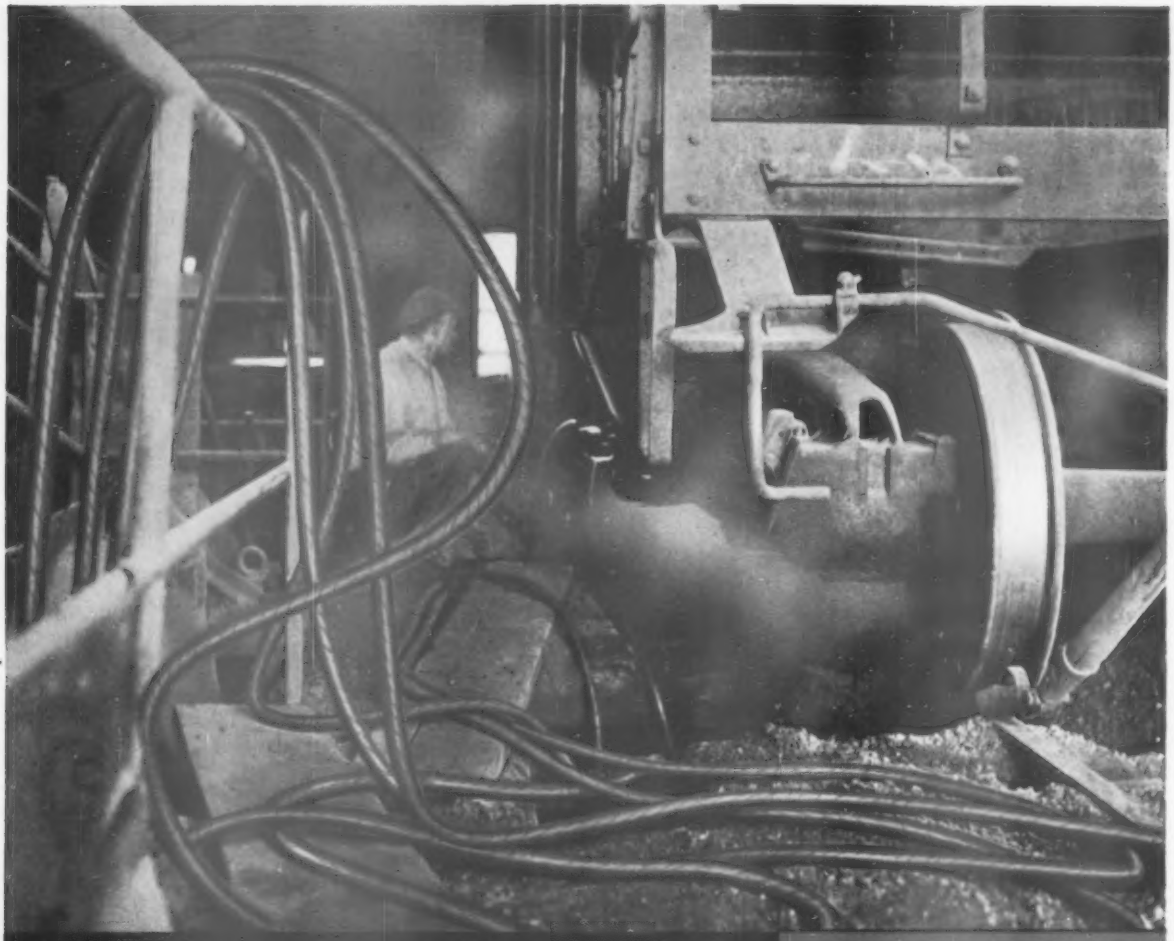
Behind the versatility and training of "The Man from Logan" is the company itself. For two generations the Logan Co. has been a name synonymous with quality, performance and dependability.

If you have a problem in the handling and conveying of your materials, why not talk to "The Man from Logan"? A letter or phone call will bring him to you right away.

Logan Conveyors

LOGAN CO., 510 CABEL ST., LOUISVILLE 6, KY.

For more facts Circle 515 on Reader Service Card



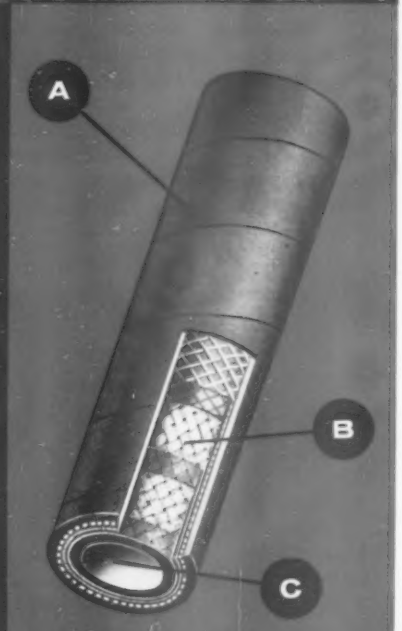
This plant turns on the steam to break loose frozen coal

The faster the coal flows the less it costs. This calls for steam at high pressure, and calls for a high pressure steam hose that's burst-protected, flexible, easy to handle. Management decided on Acme-Hamilton's wire braided steam hose because it meets all requirements and can be used for all steam applications safely and economically.

(A) Cover. Heat, abrasion, oil, sunlight and weather resistant.

(B) Carcass. 1 or 2 braids of high tensile wire. Prevents bursting, yet is very flexible.

(C) Tube. Handles saturated steam to 385°F. 200 lbs. working pressure. Won't loosen, soften or flake. Write Dept. M91.



Acme Hamilton

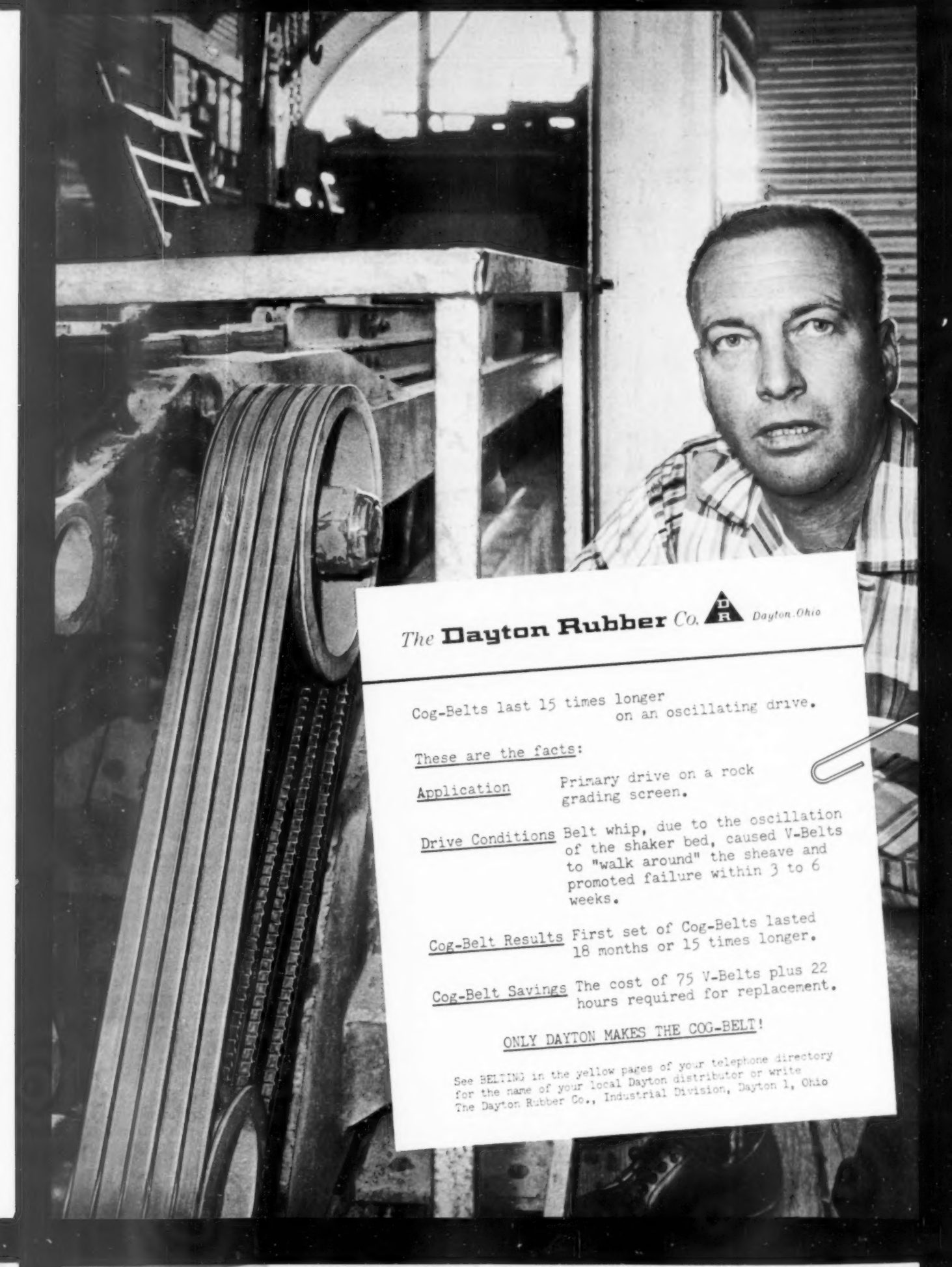
MANUFACTURING CORPORATION, TRENTON 3, N. J.

Divisions: Acme Rubber Mfg. Co. • Hamilton Rubber Mfg. Corp.

ATLANTA • CHICAGO • DETROIT • HOUSTON • INDIANAPOLIS • LOS ANGELES
MILWAUKEE • NEW YORK • PITTSBURGH • SALT LAKE CITY • SAN FRANCISCO • SEATTLE

For more facts Circle 516 on Reader Service Card

For more facts Circle 517 on Reader Service Card ➤



The **Dayton Rubber** *Co.* D R *Dayton, Ohio*

Cog-Belts last 15 times longer on an oscillating drive.

These are the facts:

Application Primary drive on a rock grading screen.

Drive Conditions Belt whip, due to the oscillation of the shaker bed, caused V-Belts to "walk around" the sheave and promoted failure within 3 to 6 weeks.

Cog-Belt Results First set of Cog-Belts lasted 18 months or 15 times longer.

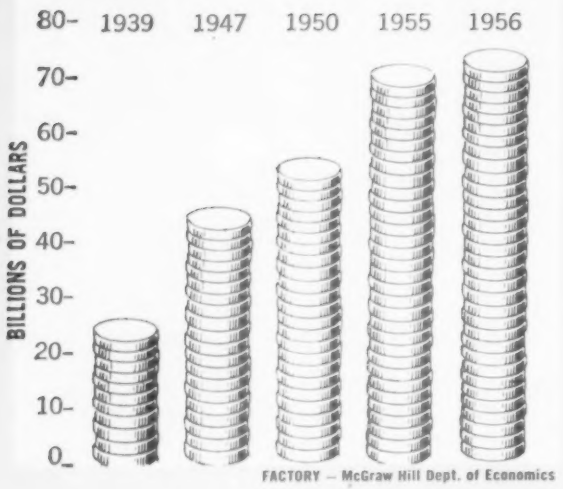
Cog-Belt Savings The cost of 75 V-Belts plus 22 hours required for replacement.

ONLY DAYTON MAKES THE COG-BELT!

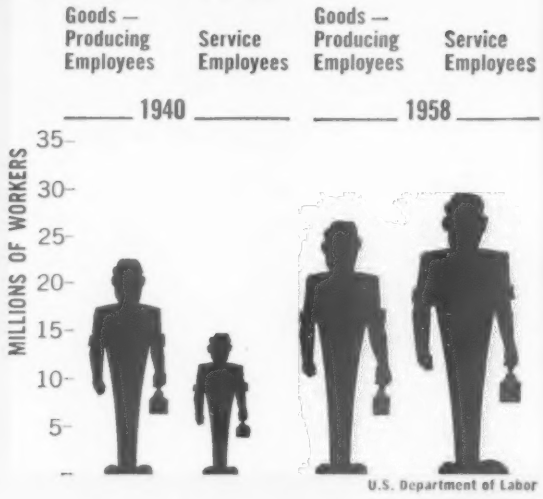
See BELTING in the yellow pages of your telephone directory for the name of your local Dayton distributor or write The Dayton Rubber Co., Industrial Division, Dayton 1, Ohio

THESE 3 MAIN PRESSURES KEEP CHANGING

1. RISING FIXED COSTS



2. BIG CHANGE IN THE LABOR FORCE



With costs—and cost accounting—in anarchy, most plant

Now They're Doing Something

THE 350 SHARPEST financial minds in American industry are quietly assembling in Cleveland this month to fight a battle. The battle is against the anarchy in cost accounting that has baffled plant operating men (maybe you) throughout industry in recent years.

These finance men—including presidents, financial vice-presidents, corporate controllers—are meeting under the auspices of the National Association of Accountants (NAA). They will try to dispel the confusion that clouds cost-volume-profit calculations. If they succeed, production and maintenance men everywhere will find the mess in factory cost analyses beginning to clear up. They'll also find that:

- Short-term reflections of profit will be more accurate.
- Payoff estimates on new equipment will be easier.
- Make-buy computations will follow a more standard procedure.
- Overtime analyses will be far more realistic.
- Cost calculations of all sorts will be more reliable, more likely to follow a well-defined pattern.

These are just some of the benefits you'll feel as a plant operating executive if the finance men succeed in this formidable task.

Root of the trouble—What has caused the mess in costs? Many things are responsible. But three things stand out (see charts, above):

- The characteristics of factory costs have changed radically in the past decade.
- Labor has changed in quality and quantity.
- A subtle but powerful combination of influences has pushed costs up—probably will continue to do so.

CHARTING THE TREND

Let's consider these three things one by one:

Changing costs—Exact figures are difficult to get. But there's little doubt among operating and finance men that the great rush toward automation has increased fixed costs both in dollars and as a percentage of total manufacturing costs. (Fixed costs are often considered to be such things as rent, property taxes, minimum plant and equipment maintenance, minimum managerial and technical staff, key service employees, and cost of inventory of materials in float.)

"There's no doubt that fixed costs have gone up," says a prominent New York economist. "I'd guess as much as 3 or 4% a year every year since 1947."

Dr. Walter B. McFarland, research director of NAA, reflects this view. He says:

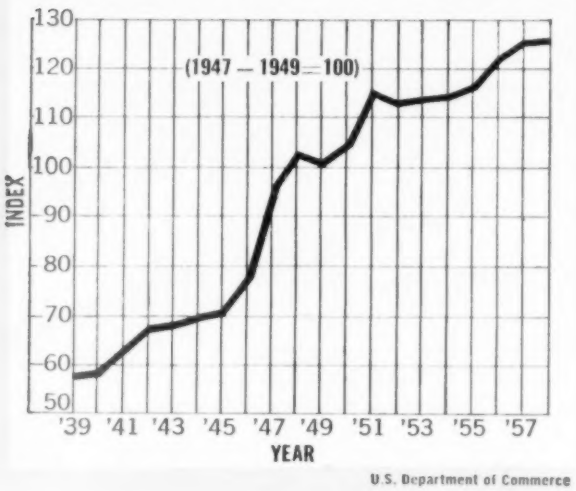
"Fixed costs have gone up continuously and rapidly since 1946, and the increase is directly related to the scarcity and increasing costliness of hand labor. As the level of skills needed for industry rises, the workforce becomes more indispensable. Once you lay 'em off they go somewhere else."

Changing labor—The dramatic changes taking place in the labor force have a dual effect. They make

By E. W. ZIEGLER
Assistant Editor
FACTORY

THE COST PICTURE

3. GENERAL COST-PUSH (INDEX, INDUSTRIAL WHOLESALE PRICES)



U.S. Department of Commerce

1. "There's no doubt about it, fixed costs have gone up consistently—as much as 3 or 4% a year."

•

2. "In 1940 so-called service industries employed only 15-million people. They now employ some 30-million."

•

3. "We've had a cost-push ever since the war and we're going to have it with us indefinitely."

operating men are all mixed up. But there's hope ahead.

About Production Cost Accounting

valuable skilled labor still more valuable, unskilled labor more expendable. But in a time of change there's great confusion on both sides of the bargaining table as to just who is responsible for the unskilled, less desirable worker.

Changing standards—Says an Atlanta management consultant: "Workers are becoming more skilled as machinery becomes more complex. What we're doing today is replacing brawnpower with brainpower, and it's expensive. Look at it this way: In Asia they've got so many people there's no use in making a factory automatic. All that would accomplish would be to throw more people out of work. Their economies keep the man down. But in America we're constantly upgrading our manpower—and we're paying for it in higher costs every day."

FIGURING THE INCREASES

How much (in dollars) have fixed costs risen? There's no accurate gage. But FACTORY, working with the McGraw-Hill Department of Economics, has derived figures that are at least conservative educated guesses. The figures come from data supplied by the U. S. Bureau of the Census (1939-56 figures). Industrial fixed costs have looked like this (in 1947-49 dollars) during the past 20 years:

1939—$26.1-billion
1947— 46.2-billion
1950— 55.1-billion
1955— 72.0-billion
1956— 75.3-billion

What extent has the upgrading of labor reached? Secretary of Labor James P. Mitchell put it this way to a group of college students in Minneapolis last October: "We are the first industrial nation in the history of the world in which there are more white-collar workers than blue-collar workers. The unskilled, uneducated, untrainable workers are all figures in a passing parade, the end of which is in sight."

What about this constant cost pressure? You've felt it for as long as you can remember. So has government. And everyone is looking for a solution.

One solution suggested by a group of economists is so out of step with convention that it has caught almost everybody off balance. This is what they propose: The best way to cure the cost push is to spend. That is to say, the best way to neutralize inflation is to inflate.

The reasoning of this school (as reported by *The New York Times*) goes like this: The cause of rising costs and prices in the past three years in America is the "cost push"—the inexorable rise of all costs, including labor costs. The best way to cut costs for each unit of production is to increase volume.

The economists go on to say that productivity rises fastest when the economy is growing fastest. The only way to increase economic growth is to increase spending. And the best and easiest way to increase spending is for government to take the lead. Thus you don't try to halt the cost push. You live with it, turn it to your purposes, make the best of it.

Now why the Cleveland meeting? The finance men are meeting for the

Three Ways to Handle Costing

Begins on page 140

sole purpose of discussing an accounting technique that promises a new measure of clarity and realism in the minds of both finance and operating men. They're calling the technique "direct costing."

It has been no secret that cost, volume, and profit depend on one another. Everyone knows it. And everyone has his own idea on how to arrive at realistic figures. But that's just the trouble. Everyone seems to have a different idea. (What plant operating man hasn't been burned up when a trick of accounting made him look like a dunce, made his department look like a collection of malingerers?)

USING DIRECT COSTING

Just what is direct costing? Direct costing (in the words of NAA's Dr. McFarland) ". . . is a plan for providing more information about cost-volume-profit relationships by segregating costs that vary with volume from costs that are fixed. Only the prime costs plus variable factory costs," he adds, "are used to cost inventory and sales."

But when anyone tries to establish a standard definition of fixed costs, confusion immediately sets in. In the first place, there just isn't any such thing as a fixed cost until someone comes along and sets up a policy that makes Cost A a fixed cost, Cost B a variable cost. But even that doesn't clear the air. Policy changes. And if policy doesn't change, certainly the interpretation of policy keeps changing as the years pass.

At best the fixed-cost ground is treacherous territory. "The division of costs into categories of fixed and directly variable costs is a dangerous and misused concept . . . a myth," says Rolfe Wyer, plant controller of Solar Aircraft Company (San Diego).

"Don't ask me what our fixed costs are," says a finance vice-president of a Chicago specialty steel company. "There ain't any such animal. I could give you figures, but they wouldn't mean anything. What was fixed cost in 1947 is variable cost today . . . and—in some instances—*vice versa*."

Turn the page

BASIC DATA ASSUMED FOR COMPUTATIONS

Quarterly Budget (in absorption costing form with fixed and variable costs separated)

	Total	Per Unit
Sales (30,000 units)	$30,000	$1.00
Costs of Goods Sold		
Variable costs	19,500	.65
Fixed costs	6,000	.20
Total	25,500	.85
Gross margin	4,500	.15
Selling and administrative costs (fixed)	2,100	.07
Operating profit	$ 2,400	.08

Actual Production and Sales in Units

	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter	Year
Opening inventory	–	–	6,000	2,000	–
Production	30,000	34,000	28,000	30,000	122,000
Sales	30,000	28,000	32,000	32,000	122,000
Closing inventory	–	6,000	2,000	–	–

1. USING ABSORPTION COSTING with Fixed Manufacturing Cost Charged to Production at Predetermined Overhead Rate of $0.20 per Unit Based on Budgeted Volume and Budgeted Overhead Cost.

	Quarters				Year
	1st	2nd	3rd	4th	
Sales	$30,000	$28,000	$32,000	$32,000	$122,000
Cost of Goods Manufactured	25,500	28,900	23,800	25,500	103,700
Add Opening Inventory	–	–	5,100	1,700	
Cost of Goods Available	25,500	28,900	28,900	27,200	
Deduct Closing Inventory	–	5,100	1,700	–	
Cost of Goods Sold	25,500	23,800	27,200	27,200	103,700
Under or (over) absorbed overhead	–	(800)	400	–	(400)
Total	25,500	23,000	27,600	27,200	103,300

	Quarters				Year
	1st	2nd	3rd	4th	
Gross Margin	4,500	5,000	4,400	4,800	18,700
Selling and Administrative Costs	2,100	2,100	2,100	2,100	8,400
Net Operating Profit	$ 2,400	$ 2,900	$ 2,300	$ 2,700	$ 10,300

2. USING ABSORPTION COSTING Without Predetermined Rate for Charging Fixed Manufacturing Cost to Production.

Sales	$30,000	$28,000	$32,000	$32,000	$122,000
Cost of Goods Manufactured	25,500	28,100	24,200	25,500	103,300
Add Opening Inventory	–	–	4,959	1,729	
Cost of Goods Available	25,500	28,100	29,159	27,229	
Deduct Closing Inventory	–	4,959	1,729	–	
Cost of Goods Sold	25,500	23,141	27,430	27,229	103,300
Gross Margin	4,500	4,859	4,570	4,771	18,700
Selling and Administrative Costs	2,100	2,100	2,100	2,100	8,400
Net Operating Profit	$ 2,400	$ 2,759	$ 2,470	$ 2,671	$ 10,300

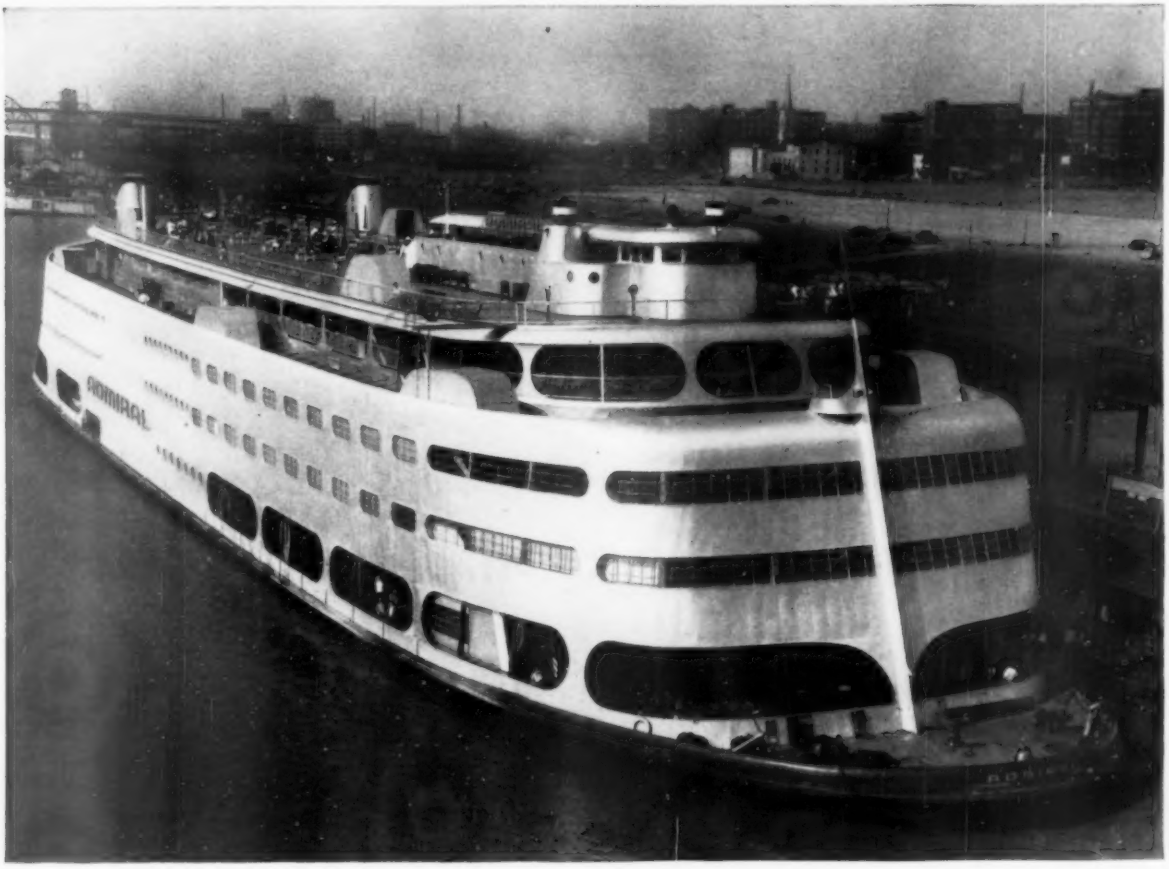
3. USING DIRECT COSTING with Fixed Manufacturing Costs Treated as Period Costs.

Sales	$30,000	$28,000	$32,000	$32,000	$122,000
Cost of Goods Manufactured	19,500	22,100	18,200	19,500	79,300
Add Opening Inventory	–	–	3,900	1,300	
Cost of Goods Available	19,500	22,100	22,100	20,800	
Deduct Closing Inventory	–	3,900	1,300	–	
Cost of Goods Sold	19,500	18,200	20,800	20,800	79,300
Marginal Income	10,500	9,800	11,200	11,200	42,700
Fixed Costs					
Manufacturing	6,000	6,000	6,000	6,000	24,000
Selling and Administrative	2,100	2,100	2,100	2,100	8,400
Total	8,100	8,100	8,100	8,100	32,400
Net Operating Profit	$ 2,400	$ 1,700	$ 3,100	$ 3,100	$ 10,300

Source: N.A.A. Research Report #23, 4/1/53

Looks new after 19 seasons

Familiar sight up and down the river from St. Louis, the S.S. *Admiral* is the world's largest inland steamer. Like-new appearance is maintained with Sunbrite Aluminum Paint, made by Sunbrite Manufacturing Company, St. Louis.



Sparkling SUNBRITE Aluminum Paint shields largest inland steamer

Just off the ways? No . . . launched in 1940. Out in all weather, exposed to varying temperatures and humidity, the S.S. *Admiral* presents the same gleaming appearance today that first thrilled Mississippi River excursionists 19 years ago.

The answer is over-all protection with Sunbrite Aluminum Paint, made with ALCOA® Pigment. Streckfus Steamship Company, river boat operator since 1884, reports that Sunbrite's durability and reflectivity result in important economies.

For example, Sunbrite cuts operating costs of the *Admiral's* huge air-conditioning plant. Because it's reflective, a good aluminum paint like Sunbrite turns back much of the sun's heat, helps keep interiors many degrees cooler.

Chances are your plant's weather-exposed surface isn't as sorely tested as the *Admiral*. But if it's not aluminum painted, it's not fully protected. Ask your paint foreman. He'll agree.

ALCOA does not make paint, but ALCOA Pigments are used in more aluminum paints than any other brand. Special formulas have been developed by manufacturers like Sunbrite Manufacturing Company to solve individual problems. These paints actually cost less, last longer, give utmost protection against heat, cold, sun, rain, smoke and fumes.

Write today for our two booklets, *Painting With Aluminum* and *Aluminum Asphalt Roof Coatings Make Time Stand Still.* Use the coupon.

For exciting drama watch "Alcoa Theatre," alternate Mondays, NBC-TV, and "Alcoa Presents," every Tuesday, ABC-TV.

Look for this label . . . it's your guide to the best in aluminum value

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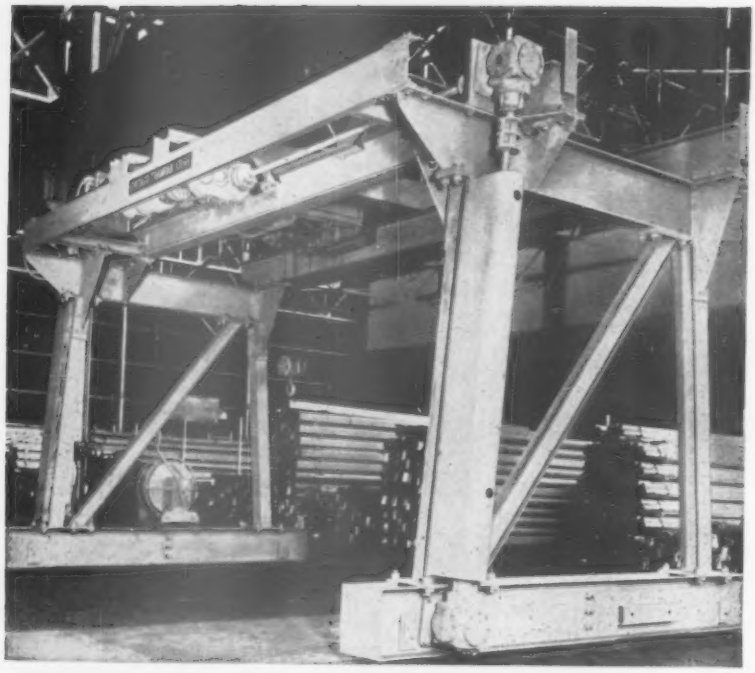

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GANTRY CRANES

At the modern plant of one of the country's largest aluminum companies, Chicago Tramrail Gantry Cranes handle long extruded pieces from a 14,000-ton extrusion press . . . transfer these pieces to other operations throughout the mill.

Fourteen Chicago Tramrail Full Gantry Cranes provide individual handling equipment for individual operations to eliminate waste time waiting for busy overhead cranes. Designed for heavy-duty, continuous service, these Gantries are built with maximum headroom and maximum clearance between legs to operate independently under the large overhead cranes.

For a practical, economical solution to your materials handling problems, see our experienced engineers. Special designs, sound engineering and broad application knowledge qualify us for helpful service.

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OVERHEAD CRANES • JIB CRANES • STACKER CRANES • MONORAIL SYSTEMS

DIRECT COSTING

Begins on page 140

New labels, new methods—Where do we go from here? Controller Wyer (writing in the *Journal* of NAA) suggests a new set of labels. He proposes that "period costs" and "product costs" are two better names for what industry now calls fixed and variable costs. Period costs, he says, are all costs that relate to providing capacity but do not relate to volume. Product costs, on the other hand, are all costs that relate to volume and vary directly with both sales and production.

New names won't win the battle alone, though, and no one knows this better than the cost accountant. That's why he's likely to turn to direct costing. Because it's primarily a system for segregating expenses more realistically.

As the computations on these pages indicate, there may be a big difference between the results you get from using standard absorption costing techniques and those you get from direct costing. The key is this: After costs are distributed to fixed and variable categories (or period and product categories, if you prefer), period expenses are charged off currently to profit and loss. Absorption costing, on the other hand, merges fixed and variable costs in charges to the same account. Three major drawbacks to absorption costing are these:

- Unit product costs vary inversely with production volume. Hence a year or less is too little time to develop burden rates.
- By charging production at a predetermined rate (based on "normal" volume) the amount of overhead cost absorbed by inventory is proportional to the share of production capacity used during a period.
- Unabsorbed overhead is viewed as a cost of idle capacity and is charged against income.

Absorption costing does, of course, supply a guide in setting long-range price goals. It also supplies cost of inventory and goods sold for financial statements according to accepted accounting procedures.

The idea behind direct costing is over 50 years old. It originated with an engineer turned budget director who wanted to help his management

Turn to page 148

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For more facts Circle 520 on Reader Service Card ➤

NOW! the most powerful fluorescent you can buy!

15,
LUM

GENERAL ELECTRIC POWER GROOVE LAMP

the arc of a 9-foot lamp in an 8-foot tube

LOWER COST OF FLUORESCENT LIGHT

If you are planning a new building or remodeling your present one, General Electric's new Power Groove Fluorescent Lamp is your best lighting buy. Imagine—a single 8-foot fluorescent that delivers a startling 15,000 lumens! Virtually twice as much light as the next most powerful G-E fluorescent.

LOWER CAPITAL INVESTMENT... LOWER MAINTENANCE COSTS

Here's the most significant part of the new G-E Power Groove story. With all the light it delivers, you can enjoy lighting levels not as practical with other fluorescents because of the number of lamps required. To duplicate the lighting level of a typical Power Groove installation with less powerful fluorescent lamps could easily require a 20% *greater* investment!

MAKE YOUR NEXT LIGHTING STEP A BIG ONE. The biggest! When you design your new lighting system, take advantage of the economies of new G-E Power Groove Lamps. Ask your G-E Distributor about them. New G-E Power Grooves are available in 4′, 6′ and 8′ lengths to fit your present Power Groove fixtures. Or write: General Electric Co., Large Lamp Dept. C-912, Nela Park, Cleveland 12, Ohio.

NOW! the most powerful fluorescent you can buy!

15,000 LUMENS

GENERAL ELECTRIC POWER GROOVE LAMP

the arc of a 9-foot lamp in an 8-foot tube

LOWER COST OF FLUORESCENT LIGHT

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MAKE YOUR NEXT LIGHTING STEP A BIG ONE. The biggest! When you design your new lighting system, take advantage of the economies of new G-E Power Groove Lamps. Ask your G-E Distributor about them. New G-E Power Grooves are available in 4′, 6′ and 8′ lengths to fit your present Power Groove fixtures. Or write: General Electric Co., Large Lamp Dept. C-912, Nela Park, Cleveland 12, Ohio.

TURN PAGE FOR THE INSIDE STORY OF THE G-E POWER GROOVE

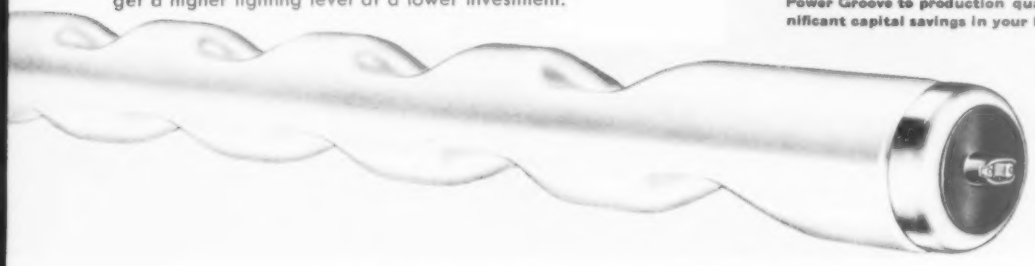
PULL
HERE

LOWEST COST OF FLUORESCENT LIGHT for most users...made possible by new

G-E POWER GROOVE

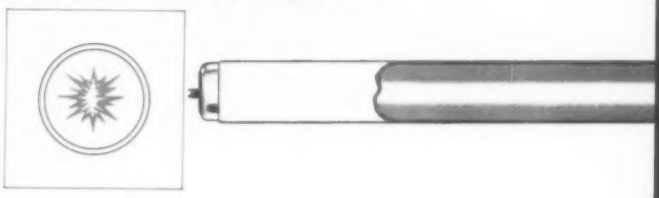
...and the secret's in the shape—a dramatic milestone in glass technology that enables you to convert *more electric power to light* in the same length lamp! You get a higher lighting level at a lower investment.

DEVELOPMENT ENGINEERS Bernard Shaw (left) and Clarence E. Hahn of G. E.'s Lamp Glass Dept. They guided the group that translated laboratory development of new Power Groove to production quantities, bringing you significant capital savings in your lighting system.

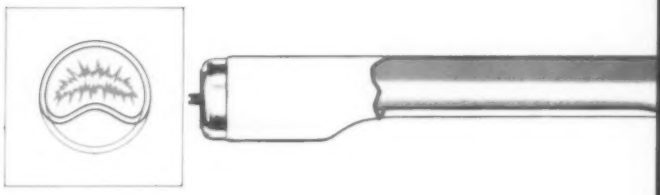


WHY THE GROOVES MAKE A DIFFERENCE

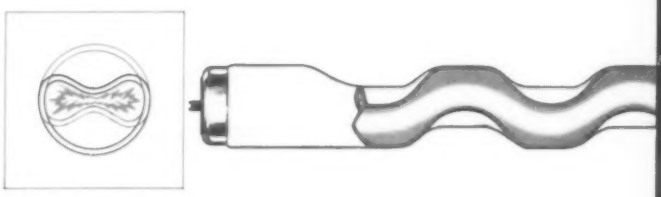
REGULAR FLUORESCENT in the conventional round shape has a straight arc stream. As in the case of any fluorescent, the arc causes mercury-vapor to produce radiation which excites the phosphor coating along the inside wall, which in turn fluoresces to give off light.



ORIGINAL POWER GROOVE FLUORESCENT, developed by General Electric in 1956, has a groove along one side of the tube, continuous except for bridging at regular intervals to increase glass strength. Resulting grooves or panels place phosphor closer to the center of the arc stream and "squeeze" the arc for greater light-producing power.



NEW POWER GROOVE has grooves on opposite sides to accomplish the same desired "squeezing" effect without bridges, but in addition makes the arc travel in a wavy path to effectively *increase* its length, thus giving you greater efficiency and even higher light-producing power.



Progress Is Our Most Important Product

GENERAL ELECTRIC

TURN THE PAGE TO SEE THIS NEW SHAPE IN LIGHT

309-9

Clean, sanitize, and Jenolize without fumes, flame, or excess water . . .

New All-Electric Hypressure Jenny!

Anywhere that flame, fumes, or excess water are objectionable or hazardous, the new Model E-350 All-Electric Jenny® will solve the cleaning or sanitizing problem. And with the new Jenolizing Process, machinery, equipment, and parts are left with a coating that protects against flash rusting, and gives a glossy, like-new appearance to painted surfaces.

Model E-350 combines the right amounts of heat, pressure, and cleaning solution to handle the majority of cleaning jobs at savings of up to 80% in time and labor costs. Its compact size, portability, low water output, and quiet operation without flame, smoke, or fuel fumes, make it ideal for use practically anywhere in the plant.

Send the coupon today for complete information. You'll welcome the outstanding performance of E-350—and the attractive plan which permits you to prove to yourself the economies of this new All-Electric Jenny.

Perfect for

manufacturing plants, food processors, textile mills, chemical and pharmaceutical plants, metal working and fabricating, petroleum industry, canneries, hotels and institutions, and every other operation where fumes, smoke, excess water are objectionable.

Mail Today!

Please send complete information on new E-350 All-Electric Jenny and Jenolizing.

Name ..... Title .....

Company .....

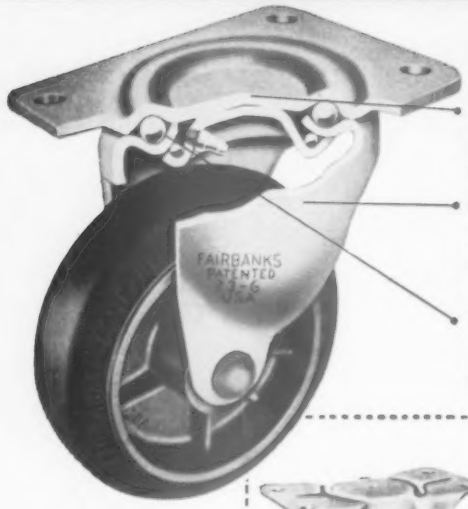
Address .....

City ..... Zone ..... State .....

hv

HOMESTEAD VALVE MANUFACTURING COMPANY
Hypressure Jenny Division, P. O. Box 86, Coraopolis, Pa.

ACHIEVEMENT
IN CASTER DESIGN
FAIRBANKS
"LOCKWELD" Swivel Casters — Without King-Pin!



CHECK these unmatched advantages:

- No King-Pin. Patented "LOCKWELD" construction eliminates the major cause of caster failures.
- Patented leg design—spherical shape provides greater strength through better dispersion of shocks and overloads, easier swiveling under load.
- Larger raceways and ball bearings — perfectly aligned by the rigid welded structure — give faster, easier swiveling action.

Fairbanks Series "23" double ball race swivel casters, for medium duty, sizes 3" to 8".

Fairbanks Series "33" rigid casters, match Series "23" casters in height, sizes 3" to 8".

Fairbanks Series "21" single ball race swivel casters, for regular duty, sizes 2" to 6". Matching rigid Series "31" casters available.

HEAVY DUTY STEEL CASTERS

Fairbanks Series "27" double race swivel casters, for heavy duty, sizes 6", 8" and 10".

Fairbanks Series "37" rigid casters match the Series "27" casters in height, sizes 6", 8" and 10".

Fairbanks Series "500" Vulcanized Rubber Tired Wheels, roller bearing, sizes 3" to 18". Standard of the industry

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in its pricing policies. He first had to find out what marginal costs were. His technique has spread slowly. By 1936 it got its name. By 1953 at least 18 large corporations were using direct costing. But even today it is not in general use. Yet the wider its spread, the easier your job is going to become.

Meanwhile, the implication for you as a plant operator is clear: You're probably in the middle of an infinite cost spiral. The best thing to do is minimize the effects of the cost push on your plant by vigorous cost analysis and cost cutting. But you'll still have a hard job finding out just what your costs really are, whether they can be cut, and whether they're actually within your domain at all.

WHAT DIRECT COSTING DOES

Now let's return to those direct cost-absorption cost figures (above) for a minute. As the NAA's research report, "Direct Costing," points out, the difference between the quarterly profit figures as determined by absorption costing (see page 140, Computations 1 and 2) and direct costing (Computation 3) is the result of the change in the amount of fixed cost contained in inventory cost. For any period you can easily compute the difference between the two systems by using the following formula:

$$\begin{Bmatrix}\text{Profit computed by}\\ \text{absorption costing}\end{Bmatrix} - \begin{Bmatrix}\text{Profit computed}\\ \text{by direct costing}\end{Bmatrix} = \begin{Bmatrix}\dfrac{\text{Total fixed manufacturing cost}}{\text{Standard volume of production}}\end{Bmatrix} \times \begin{Bmatrix}\text{Volume produced} - \text{Volume sold}\end{Bmatrix}$$

There are six generalizations that NAA makes about the systems:

• When sales and production are in balance at standard volume, direct and absorption costing methods yield the same profits (see page 142, column for first quarter). Either method charges the amount of fixed cost for the period against income for the period.

• When production exceeds sales, absorption costing yields a higher profit than direct costing shows (see column for second quarter). Why? Absorption charges a portion of the fixed manufacturing cost to inventory and thereby defers it to future

Engineered Maintenance reduces supervisory time, building depreciation expense, and sanitary supply costs for Royal Packing Company

Engineered Maintenance keeps work surfaces spotless.

"Gives us far better organization and control of plant housekeeping"

"Puritan Engineered Maintenance has helped us achieve a higher sanitation level while actually saving money."

As a meat processor, Royal Packing Company, St. Louis, Missouri, always has been sanitation conscious. Yet the introduction of Puritan Chemical's new ENGINEERED MAINTENANCE techniques helped this leading meat producer save money in three important areas. "And," says Mr. Ben Gray, General Superintendent and Purchasing Agent, "the general improvement in plant housekeeping has made it easier to meet all government inspection standards."

Thoroughly tested in both Royal plants, ENGINEERED MAINTENANCE has relieved executives of the vexing and time-consuming little details of sanitary maintenance management. It has made supervisors' jobs easier by providing them with an organized plan and thoroughly trained help.

How Engineered Maintenance works

You receive a complete, individually planned program, based on a personal inspection of your plant, and prepared by professional engineers. The program is set up to meet the exact requirements of your company. Your custodians' work is organized. You are provided with a system of automatic controls. You are certain of continuing follow-through and review, not only by members of your organization, but by Puritan trained service representatives as well.

Why it is so important

In these days of increasing operating costs, more efficient sanitary maintenance is the logical way to protect your company's investment in plant, equipment, and higher pay scales. Management appreciates this . . . and ENGINEERED MAINTENANCE provides you with a new and tested solution, without requiring you to ask for a larger budget.

Engineered Maintenance available as a service—without charge to you!

Puritan will inspect your plant, review your present sanitary maintenance procedures, submit and help install an individually planned ENGINEERED MAINTENANCE Program for your company. As a user of Puritan Sanitary Maintenance products your receive this service free.

Puritan products are nationally used, competitively priced, fully guaranteed. You do not pay a premium of any kind for either your ENGINEERED MAINTENANCE Program or for any Puritan product. You are not involved in any long-term contract. The burden of proof is upon us.

New booklet gives more detailed explanation

Write for "ENGINEERED MAINTENANCE." This new technical brochure explains the Puritan program fully . . . shows how it will help your company . . . how it will save your time.

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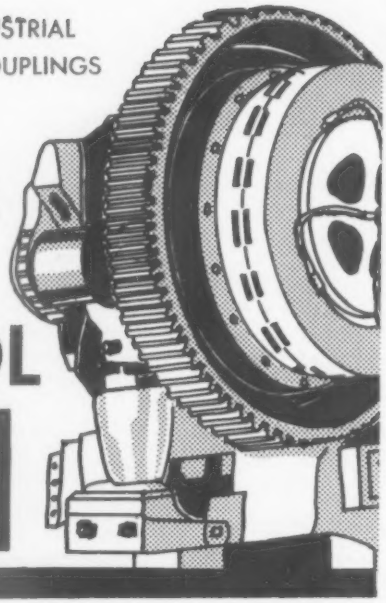
KEEP the wheels of industry COOL



ALL PURPOSE
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The mighty machines of American industry "keep cool" with lines connected quickly and easily with Roylyn Industrial Couplings. Too, the fluids that nourish these machines pass through these popular couplings from tank to tank car to truck to user.

IMPORTANT FEATURES

Quick Connecting	Increased Efficiency
Full Flow	Economical
Ease of Operation	Vibration Proof
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Open and Self-Sealing	Adaptability between
High Pressure Seal	Like Sizes
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Open

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Begins on page 140

periods. (Total fixed cost charged against income for the period is therefore less than fixed cost incurred during the period.)

• When sales exceed production, direct costing shows a higher profit than does absorption costing. The reason is that fixed costs previously deferred in inventory are charged to income in the period in which goods are sold. Total fixed costs charged against income therefore exceed the amount of fixed cost incurred during the period.

• When sales volume is constant but production volume fluctuates, direct costing yields a constant profit figure because profit is not affected by inventory changes. Under the same circumstances absorption costing yields a fluctuating profit figure that moves either with or against sales volume (as shown in the computations).

• If production volume is constant, profit is directly proportional to sales under either system of costing. Profit figures will move in the same direction but will not necessarily be the same in amount.

• The divergence between quarterly profit figures in the two systems becomes progressively smaller as the accounting period gets longer. Thus their annual differences are usually smaller than their monthly differences. Over a period of years the two methods should produce equivalent results because sales cannot continuously exceed production nor can production continuously exceed sales. (The annual profit figures in the two systems indicate this gradual equalization.)

NEW WAY—YES OR NO?

In summary, then, what are the advantages and disadvantages of direct costing?

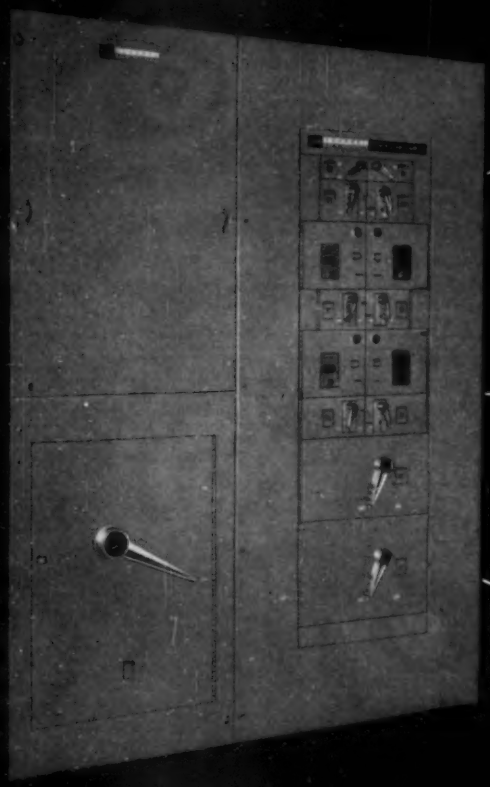
Advantages add up to seven:

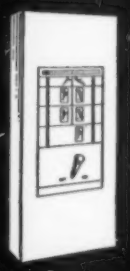
1. Operating men can find out what the cost-volume-profit relationship is without working with two—or more—sets of data.

2. Profit for a period isn't affected by changes in absorption of fixed expenses resulting from building or reducing inventory. If sales mix, costs, and prices remain stable, profits will move in the same direc-

Another Engineering Achievement

get centralized power distribution at low cost





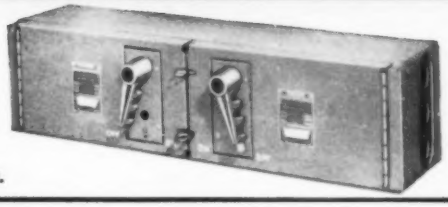
Power Distribution Panels

Motors

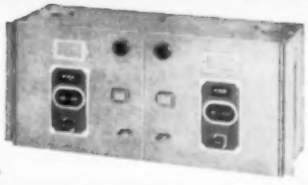
Lighting Panels

with new shallow depth switchboards

A.



B.



C.

Here is versatility you never dreamed possible in switchboard design. Only 14 inches deep and rigidly constructed of prepunched, formed 11 gauge steel channels... these switchboards take a variety of interchangeable control and distribution units of modular dimension, giving a new degree of flexibility and centralization of power distribution equipment. Advantages: consolidates all of your motor starters, fusible switches, and circuit breakers into a professional looking installation with less floor space, lower installation and maintenance costs and greater flexibility in meeting future requirements. For complete details write today for Bulletin #3-310, Federal Pacific Electric Co., General Offices: Dept. 310, Newark 1, N. J.

A. TYPE AB CIRCUIT BREAKERS from 15 through 800 amps. Compact... positive protection... quick-make, quick-break operation... thermal-magnetic trip.

B. QMQB FUSIBLE SWITCH UNITS from 30 through 1200 amps. Heavy duty construction... quick-make, quick-break operation... visible blades... front operation.

C. MAGNETIC OR MANUAL MOTOR STARTERS in NEMA sizes 0 through 5. Pushbuttons, pilot lights, and accessories may be added as required.

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The Best in Electrical Distribution and Control Equipment.

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Intricate or simple, small or bulky—if your product requires degreasing, DETREX PERM-A-CLOR NA is your assurance of cleaner cleaning. This premium grade solvent's unequalled combination of economy, safety, stability and cleaning ability has established it as standard in thousands of varied installations.

Should your production line require other metal cleaning or processing materials—or the machines and technical assistance to provide you with the greatest efficiency—DETREX can supply the exact combination to do the job for the lowest possible cost.

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DETREX, pioneer in all phases of metal cleaning and processing, can save you money. Write today for full information.

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tion as sales under the system of direct costing.

3. Operating men find it easier, quicker to use direct cost data because the data follow management's thinking more closely than absorption costing data do.

4. Impact of fixed costs on profits is easier to gage because the total amount of such cost per period appears in the income statement.

5. Marginal income figures make it easy to appraise products, territories, classes of customers, without having results obscured by allocation of joint fixed costs.

6. Direct costing works with cost-control tools such as standard costs and flexible budgets.

7. Direct costing is a concept of inventory cost that closely corresponds with the current out-of-pocket expenditure necessary to make the product.

Disadvantages add up to four:

1. It's always a difficult job to identify a fixed cost, particularly in the misty realm of "semi-variable" costs.

2. Complete manufacturing cost is not determined in the process of costing production. Supplemental allocation of fixed overhead on some volume base must be made to provide product costs for long-range pricing and other policy decisions.

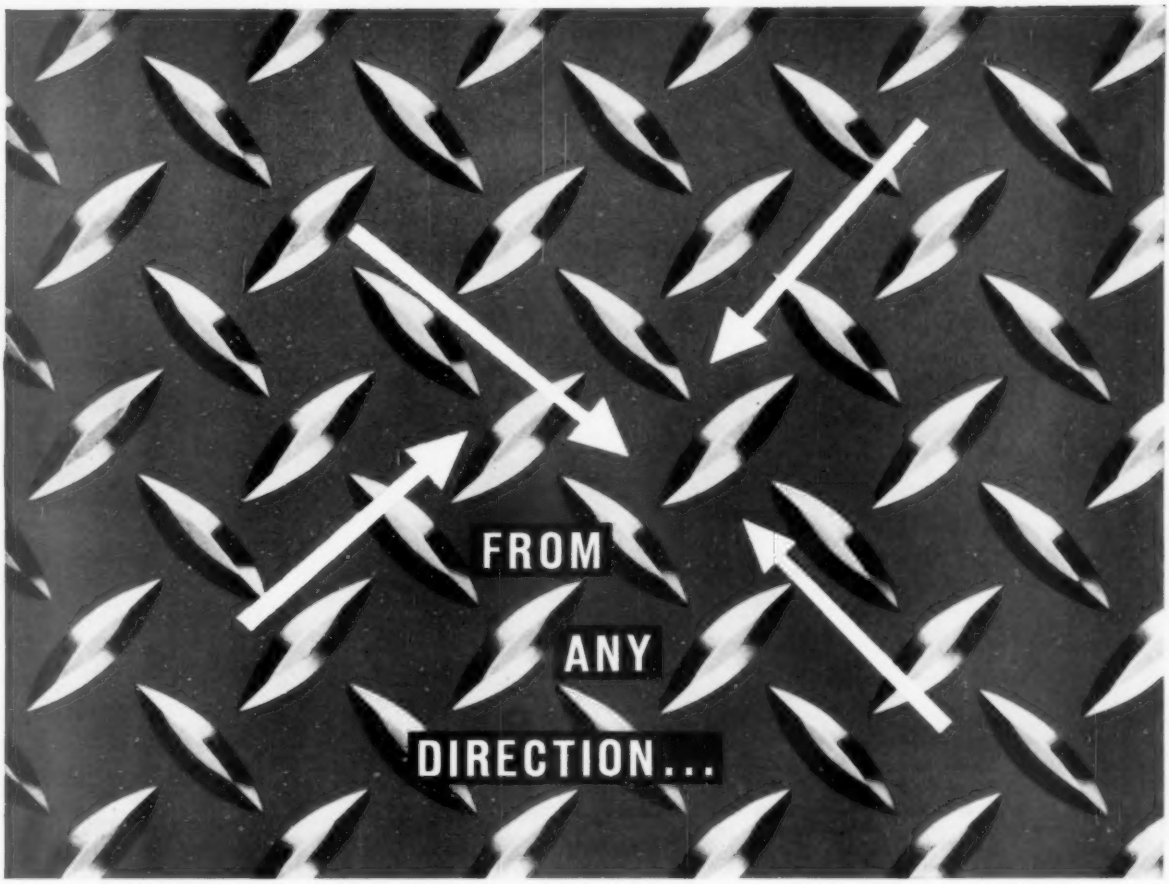
3. There may be income tax trouble. Although the U.S. Treasury has never officially commented—pro or con—on direct costing, it's possible it will balk if a change is made from full cost to variable cost for costing inventory.

4. There are those accountants who question the acceptability of direct cost as a basis for costing inventory in financial statements that are prepared for both stockholders and public.

TWO STEPS TO IMPROVEMENT

Now where do we stand? You have seen that fixed costs are rising, that the labor force is becoming more skilled day by day, that we have a built-in cost push that's here to stay. You have also seen that there's anarchy in accounting and that you suffer as a result.

Here are two steps that should



Alan Wood Super Diamond floor plate ...is easy to clean

Sweep it . . . hose it . . . mop it . . . at any angle, A. W. Super Diamond is easy to clean. No pockets to hold dirt or water . . . the unique design of this rugged floor plate lets water drain quickly in any direction.

A. W. Super Diamond is easy to fabricate, too . . . it can be sheared, welded, formed, and easily matched. The arrangement of the exclusive pattern allows you to bend it at any place. This is a heavy duty floor plate that will last for years . . . and provide a safe, non-skid footing.

For easy cleaning . . . for easy fabrication and installation . . . for long wear . . . specify A. W. Super Diamond. Write for Bulletin SD-N10.

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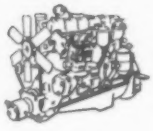
IT'S A FACT:

ALLIS-CHALMERS LIFT TRUCKS SAVE YOU MORE... MAKE YOU MORE!

HERE'S PROOF... When it comes to sustained high production over the years — ability to stay on the job and out of the shop — Allis-Chalmers trucks have it! As these owners happily admit:

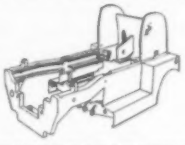
"Maintenance costs are one-third less than with lift trucks previously used" reports a Michigan factory. "We used to replace an engine a year," says the vice-president. Haven't replaced any in our Allis-Chalmers trucks."

Reason: The heavy-duty, industrial engine is the strongest and most rugged used in a fork truck.



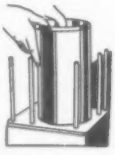
Downtime, None — That's the report of a Florida cement block manufacturer. His 4,000-lb lift truck has operated steadily for more than three years.

Reason: Rugged construction of Allis-Chalmers trucks which is typified by automotive-type frames.



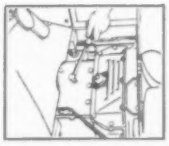
"They're tougher and require less maintenance," says the mechanic at a Wisconsin foundry. "I particularly like the overhead valves and wet cylinder liners — makes our job a lot easier."

Reason: Wet cylinder liners are easily replaced — no need to rebore.



"They're certainly accessible to work on," says the mechanic at a Missouri factory, "— although we have not had too much maintenance and no parts replaced at all so far."

Reason: A good example of accessibility: only 30 minutes is required to change a clutch.



Let your material handling dealer show you additional production and maintenance figures for Allis-Chalmers lift trucks that make their superiority a *fact*. Allis-Chalmers, Milwaukee 1, Wisconsin.

A-C ALLIS-CHALMERS

BH-105

Plan to stay ahead... MODERNIZE!

Begins on page 140

help you to neutralize the effects of the confusion:

1. Inform yourself—Be willing to learn what your plant accounting department and NAA are trying to do. The best way to overcome the obstacles accounting places on your right-of-way is to become half an accountant yourself. Your knowledge of direct costing puts you up-to-date with the most modern technique of cost accounting. So you have already started to inform yourself.

2. Stay flexible—There's not much question that plant managers tend to harden in their attitudes. For example, a FACTORY editor spent a full day last summer listening in on an industrial engineering seminar at a large Eastern university. One thing became clear: Operating managers have serious trouble with their accounting departments on at least two major fronts:

- Accounting's attitude toward depreciation is different from the engineer's attitude. The tendency is for accounting to hold out for a full depreciation period. Accounting will disagree with the accuracy of your figures if they show the return on a new project would make it worthwhile to fully depreciate and junk a piece of equipment.
- Accounting's methods of keeping records make it difficult—even impossible—to get data needed to tell the full story of return from a proposed project. A glaring example: In one company one approach yielded a $400,000 figure, another a $400 figure. Yet both were the same thing. In the first instance ($400,000), all charges were lumped in a separate account. In the second ($400), accounting distributed charges back to operations.

The operating man feels that the finance man doesn't understand and doesn't care about the problems of production. But it isn't always so. This Cleveland meeting is evidence of a deep concern for better production-accounting coordination. You may not see any change soon, but the time will come. In the meantime stay flexible. And relax. You can't change history. The cost push isn't going to slacken any time soon. And cost confusion isn't going to evaporate overnight. **END**

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CALL THE TRUSCON MAN...

Be Sure You Have The Best "Paint Protection"

The way to paint-protect your plant, inside and out, at the lowest cost is to use the paint that stays on *longest*. You get maximum economy and maximum protection. Fact.

The paint that stays on longest is the paint that's formulated for specific surfaces under conditions that exist in your plant. There is no one type of paint that is good for all surfaces. Apply one type of paint on all surfaces and you get short-term protection at high cost. False economy.

Call the Truscon man. He'll survey your entire plant — interior and exterior — and give you a detailed report in writing. It will show you whether you have proper protection or whether you're in danger. Absolutely no obligation on your part.

Truscon has been solving industry's paint-protection problems for 50 years. All over the world. Names of well-protected Truscon customers will be sent you on request.

Whatever the surface, whatever the conditions, Truscon formulates protective coatings that insure longer plant life for you. See the Yellow Pages of your telephone directory for the Truscon factory branch nearest you. Or write Truscon Laboratories, 1700 Caniff Street, Detroit 11, Michigan.

Resists the Penetration of Water

Protected with TRUSCON

the "cheapest" way to paint is to use the best paint ...it stays on longer

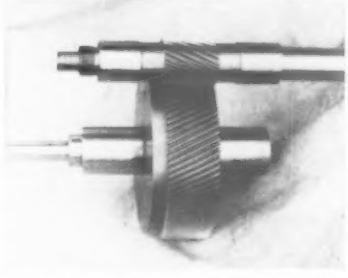
TRUSCON *Laboratories*

Industrial Maintenance Division of Devoe & Raynolds Co., Inc.
Detroit 11, Michigan

Look Inside THE FIRST 100% PACKAGED CENTRIFUGAL WATER COOLING SYSTEM

Look Inside

...The York Borg-Warner Power Transmission



Engineered in the BORG-WARNER tradition of quality power transmissions... famous for efficient, trouble-free performance for many years.

Exclusive YORK Turbopak Is 50% Smaller, 35% Lighter

Factory engineered-and-packaged, that's YORK's hermetic TURBOPAK. Contains the most nearly hermetic centrifugal compressor yet made. Lighter and smaller than any other, too. It's a fact...because no other packaged water cooling system has the built-in world-famous BORG-WARNER transmission gear. Requires a 50% smaller compressor rotor than directly coupled systems. Means quiet, vibration-free performance in any location. One-piece, rigid base construction simplifies engineering layout, requires less space, and completely eliminates field assembly. Decoratively styled to include fully wired electronic control center for precise, automatic capacity control.

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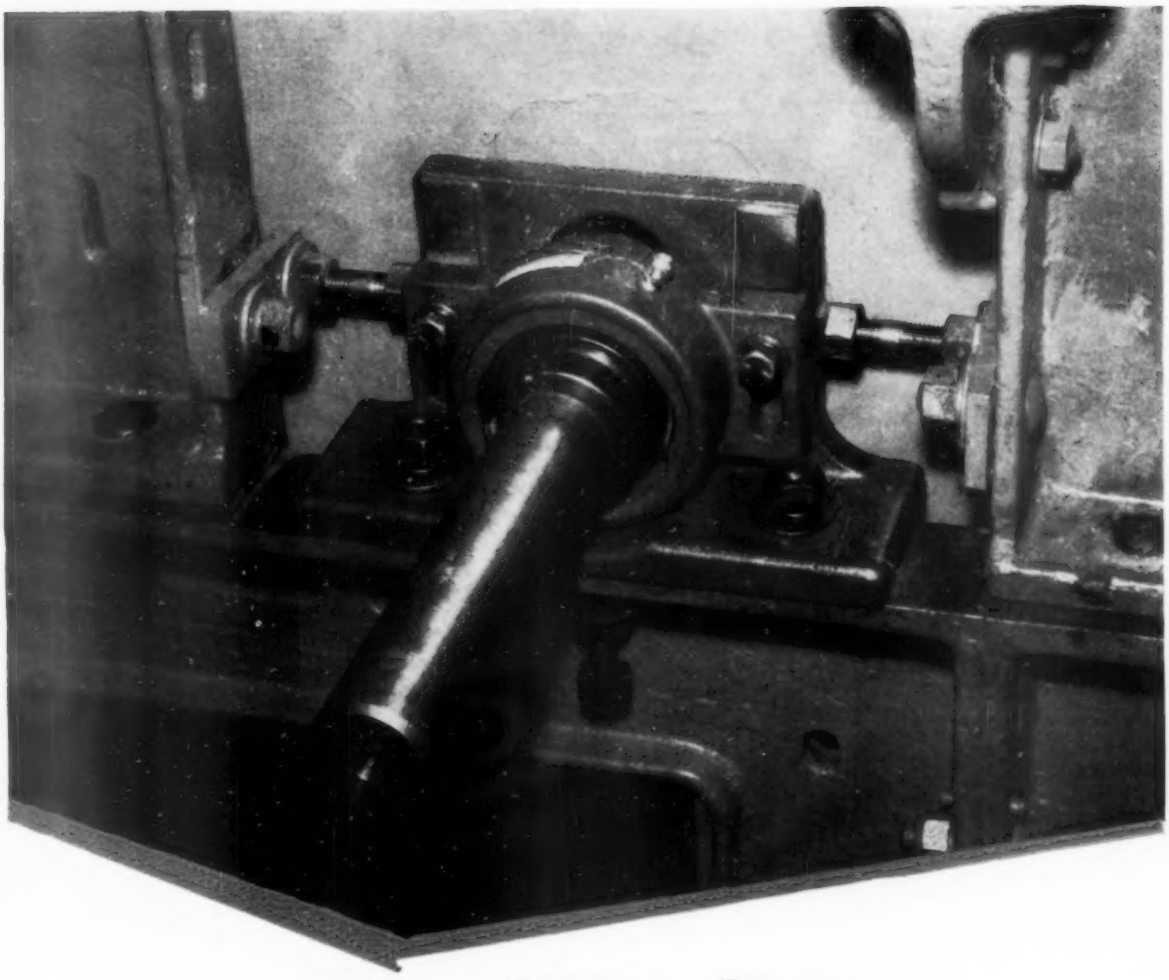

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designs and supplies anti-friction bearing conversion units for many applications

This sliding, take-up unit is installed on textile mill equipment. It illustrates one of many clean, practical fixtures our bearing engineers have designed to hold the bearings best suited to carry shafts with a minimum of maintenance and with low power consumption. Our customer is pleased with the success of this installation in cutting operating costs, improving quality and increasing production.

Your request for a Bearings, Inc. engineer to survey your machinery and recommend anti-friction bearing conversions where practical, will be promptly answered. It's a service we're glad to perform at no cost to you.

Call the Bearings, Inc. branch nearest you NOW!

Providing bearing service in the North ➤ **BEARINGS, INC.**

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FACTORY

IDEAS OF THE MONTH

By LEWIS K. URQUHART, Consulting Editor

(For more information, circle item numbers on Reader Service Card next to back cover)

Flies die like flies when given the one-two with new thermal dry fogger (*Aero-Master*). So do roaches, ants, silverfish, or what have you? Portable machine (24 lb.) fogs for as little as 1¢ per 1000 cu. ft. **(291)**

Business trip coming up? Got hotel reservations? You can make them via Reservatron in 49 hotels (*Sheraton*) in 37 cities in U. S. and Canada. And have them confirmed in 4 seconds! Booklet (96 pages) describes this and many other conveniences, including the new "secretarial suite." **(292)**

Steep Grade is name of new 12-ft. belt conveyor (*New London Engineering*) with working angle up to 60 deg. Stacks cartons 16 ft. high. **(293)**

No unsightly plumbing with water cooler (*Westinghouse*) that fits flush against wall. You save space, too—26% or more. **(294)**

For respiratory emergencies there's a resuscitation kit (*Air-Shields*) with hand-operated respirator, foot-operated pump. No electricity. No compressed gas. Goes to work without time-wasting set-up. **(295)**

Nary nut nor bolt in this new free-aligning coupling (*Atomatic*). Coupling halves are joined by and transmit thrust through helical wire springs. All you need is a screwdriver to connect or disconnect. **(296)**

Conveyor belts spliced the Wedlock way (*Manhattan Rubber*) are hitched for keeps. And no costly field vulcanizing. **(297)**

Try Edg-Pak any time your current miseries include damage to critical edges or surfaces of nested pieces. This cushioning material (*Flex-O-Lators*) will also protect parts from steel strapping damage in packaging. **(298)**

Miracle Totes (*Paige*) can be stacked to ceiling if need be, stored flat when not in use. Three convenient sizes. **(299)**

Your maintenance painting boss will find this quick-reference guide (*Barreled Sunlight*) an invaluable aid in choosing the right finishes for exterior and interior painting, enameling, and varnishing. **(300)**

Slide chart of the month shows which vibration control mountings (*Unisorb*) for which machines—from abrasive cutting to x-ray. **(301)**

Don't show off behind the wheel! That's tip No. 1 in new free booklet (*Standard Oil, Ind.*) for distribution to teen-agers. **(302)**

For noisy spots where communication is next to impossible, try Sound Barrier (*Willson*). It consists of speaker boom and earphones built into earmuff-type hearing protectors, leaves hands free. **(303)**

Condulite is high-impact, durable plastic conduit (*Carlon Products*) that speeds up underground cable installations. Weighs one-eighth as much as iron pipe. And you can cut it with ordinary handsaw. **(304)**

Newest aid to two-way talk is Radio-Phone (*RCA*). It operates on FCC citizens' band frequencies. It's 9x7x5 in., weighs under 10 lb. **(305)**

Training apprentices? There's a 110-page reference manual (*U. S. Dept. of Labor*) that contains sample apprenticeship schedules for 28 occupations in electrical and electronics trades. It's free. **(306)**

Neatest platform ladder we've seen in a couple of moons is BodyGuard (*Lincoln*). Tiltproof platform (11x14 in.) stays locked till you flip it closed. "Circle of safety" guardrail provides maneuverability without danger. **(307)**

Want to know how to select heating equipment and controls for surface heating? New guide (*General Electric*) also gives ratings for surface and platen heating, heat-up time for metallic platens, etc. **(308)**

61 cleaning jobs simplified! Plant maintenance guide (*Oakite*) describes specialized chemical materials, lists specific applications, points way to folding-money savings on equipment cleaning, repair, overhaul. **(309)**

Speaking of cleaning, there's a telescoping window washer (*Tucker*) for third-story windows. Operates from safe stance on terra firma. **(310)**

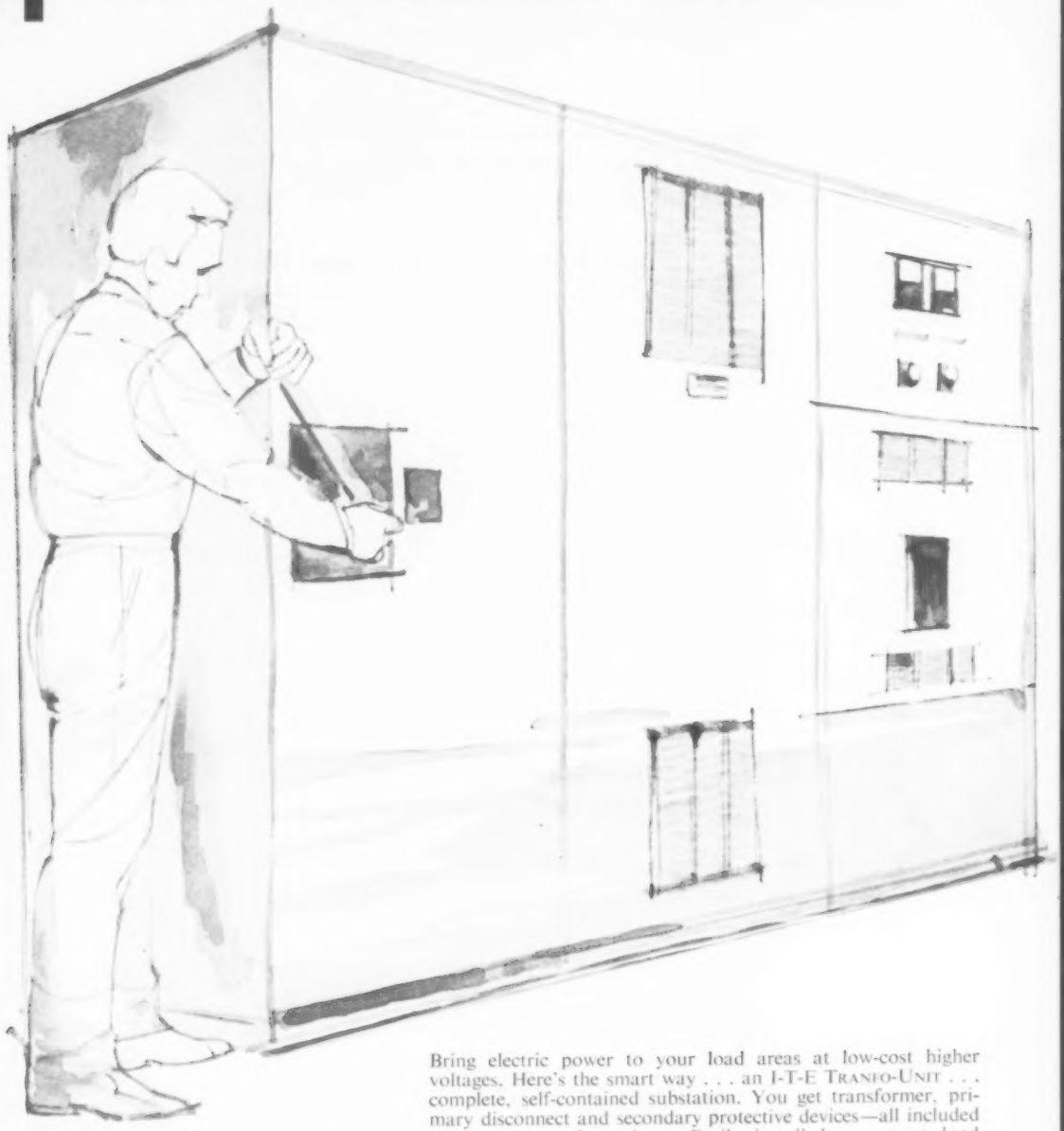
Concrete block looks like tile when sprayed with Glid-Tile, a new thermosetting polyester resin (*Glidden*) that cures to a tough, chemical-resistant coating. Use also on wood, metal, plaster, wallboard. **(311)**

Gard-House (*General Mower*) is answer to anyone's prayer for small (7x7 ft.) storage building. It's heavy-gage steel, side and rear panels horizontally ribbed for added strength. Garage-type overhead door, 56 in. wide. **(312)**

How're your decimals? Chart (*Ohio Seamless Tube*) gives equivalents for fractions from $\frac{1}{64}$ to 1. Hang on wall. Or slide under desk glass. **(313)**

More Ideas of the Month in Press Time Report following page 54

I-T-E CIRCUIT BREAKER COMPANY



SMART

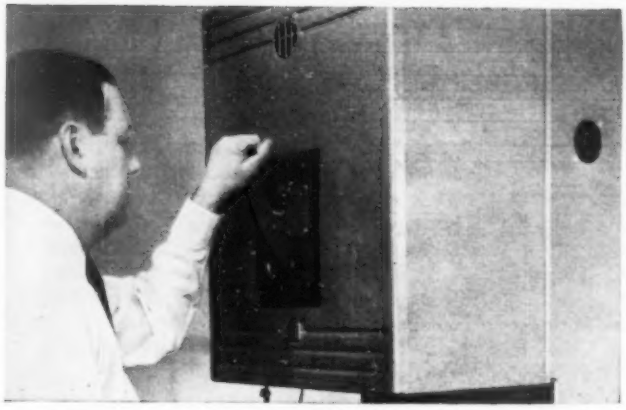
Bring electric power to your load areas at low-cost higher voltages. Here's the smart way . . . an I-T-E TRANFO-UNIT . . . complete, self-contained substation. You get transformer, primary disconnect and secondary protective devices—all included in one neat, safe package. Easily installed near your load centers. Improves motor performance and lighting efficiency . . . slashes line losses.

An I-T-E TRANFO-UNIT costs no more than hodgepodge arrangements of assorted gear. But it looks so much better. It's safer. And it makes possible significant economies. For example, it's delivered in one piece . . . saving installation expense. Wide choice of components means complete design flexibility. So you can meet your own requirements exactly. Available in the industry's widest range of kva ratings.

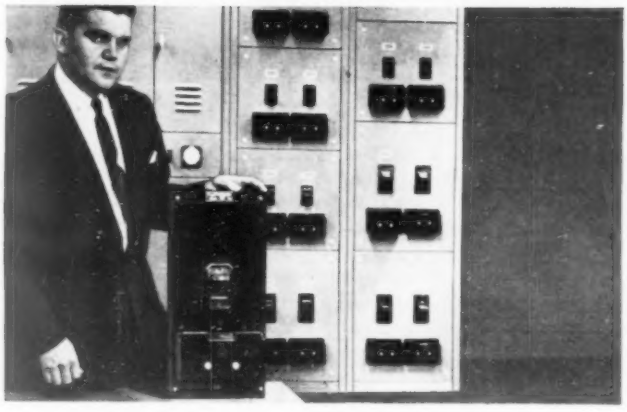
Applications for which an I-T-E TRANFO-UNIT is particularly suited include: small industrial loads, warehouses, hospitals, schools, office and commercial buildings. When you install electrical equipment for such uses, benefit from the advantages of the I-T-E TRANFO-UNIT. They are typical of the advantages you get in all I-T-E equipment. Yet when you buy I-T-E, you pay no more. Why buy anything else?

FACTORY

Metal-clad switchgear you can be proud of. Extra sturdiness for longer life. Extra craftsmanship for finer appearance. Extra safety for greater personnel protection. All components completely accessible. Even rear doors are hinged. Advanced design, uniform-flux-density coils mean extra protection against heavy current faults.



600 volt value package. New URELITE® individually enclosed I-T-E K-line circuit breaker—world's most advanced. Main disconnect contacts visible through side window for extra safety. Pull-down handle action provides quick manual make for safety and long contact life. New wide-range overcurrent trip device lets you increase breaker setting when your load increases. No parts to replace.



Saves 50% switchboard space. I-T-E CORDON® circuit breaker provides up to 100,000 amp interrupting capacity with molded case construction. Costs approximately ⅓ less than alternative devices. Available in sizes for many applications, loose or individually enclosed.

I-T-E Circuit Breaker Company
1900 Hamilton St., Phila. 30, Pa.

- ☐ Low voltage switchgear
- ☐ Metal-clad switchgear (5 and 15 kv)
- ☐ Secondary unit substations
- ☐ Outdoor substation structures
- ☐ TRANFO-UNITS
- ☐ URELITE circuit breakers
- ☐ Small air circuit breakers
- ☐ CORDON circuit breakers
- ☐ Power switching centers

Name.....Title.....

Company.....

Street.....

City.....Zone.....State.....

SEND COUPON

Get full details on specific I-T-E equipment. I-T-E engineering assistance is at your disposal.

HUMAN RELATIONS

By GEORGE A. HOY, JR., Industrial Management Editor, FACTORY

Cha-Cha, Anyone?

Sign up now, urges Eastman Kodak Company's (Rochester, N. Y.) employee newspaper. Learn the cha-cha, the calypso, the waltz in 8 weeks. Two courses are offered—one for beginners, one for pros. Cost of each: $7. It's sponsored by the Kodak Park Athletic Association, an employee group that functions with the aid of a company staff.

If you want a tough yardstick to measure your employee recreation program, Kodak qualifies. Here's a list of functions announced for one nine-day period: a photo-and-slide exhibit, a square dance, a family matinee ("Old Yeller"), the Foreman's Club variety show, opening night of a boating safety course, a euchre tourney, a noon-hour civic orchestra concert, a skating party for young adults, casting classes, and a boxing show. Many of the events are open to families.

Time-Conscious Managers

Are your foremen a little weak on time standards? It's no problem at Worthington Company's Compressor and Engine Division (Buffalo, N. Y.). There every foreman comes up from the ranks. But no foreman goes directly from the ranks to the foreman job. He first spends two years as a standards man.

No Hope for Jokesters

Got a speech coming up? Borrowing joke books right and left? Looking for gags? They're not necessary—may be unwise.

Here's what W. H. Depperman, director of public relations for Link-Belt Company (Chicago), says about business speakers:

"The objective of the business speaker . . . is to impart information. He is not expected to be a comic, nor should his talk be a series of gags. A bright remark and a joke or two are helpful. But only if the speaker has the ability to get them off smoothly. It's a serious mistake for the once-in-a-while speaker to imitate Bob Hope if he hasn't got what it takes. If he has got it, television is crying for him.

"Lacking the abilities of a professional speaker," Depperman continues, "the average guy must depend on the content of his talk for its effect. . . A speech is an opportunity for you to talk business at a time and place and before an audience that will appreciate what you have to say. You will find it genuinely satisfying and rewarding."

Better Break for Oldsters

Compulsory retirement at age 65 makes no sense to D. S. Sargent, personnel director of Consolidated Edison Company of New York, Inc. And his reasoning isn't based on a dewy cloud of charitable thinking. It's based on hard U. S. dollars.

Sargent calls up the example of a mechanic who is 65 years of age, still very capable, with annual earnings of $5800 per year. In Con Edison he, like any capable employee with a good record, is given the option to continue working for as many as three more years. (Of all employees who had the option given them in 1958, 32% accepted.)

If the over-65 worker works, the company saves $1749 per year in pension payments. And the government saves something in the vicinity of $1800 per year in social security benefits.

Sargent's figures enable him to show that total savings during the 1953-57 period amounted to $297,000 for Con Edison, plus savings of $188,000 for Uncle Sam. And the employees, of course, had more than twice the income they would have had if they had retired.

What about the worker who has slowed down in his job? He's not invited to stay past his 65th birthday. That's only about 10% of the total who reach the ordinary age of retirement.

Safety—or Sorrow?

That's the slogan that won the first-prize award money for a plant employee at Russell, Burdsall & Ward Bolt & Nut Company (Port Chester, N. Y.). The contest winner took home $50. RB&W's plant sports a lost-time accident record that's down 45% from its year-ago figure.

The safety-slogan contest was part of a campaign to rekindle interest in plant accident prevention. Employees submitted over 100 slogans. (That's one for every six employees.) A team of managers judged the entries, decided "Safety or Sorrow" stood out best in a field of tough contenders. The slogan is now plastered throughout the plant.

Tougher Training Ahead

Waiting for the day when technological advances will reduce the human problems in your job? D. S. Harder, Ford vice president and technical adviser who headed all company manufacturing until last year, figures you'll probably have a long wait—more than 50 years at the least.

"Technological breakthroughs will provide tools of greater efficiency," says Harder. "But they won't make people obsolete. In fact, people problems will become more urgent." Says he, "We can look to schools to give students a grounding in fundamentals, but it is unrealistic to expect our school system to teach our population the special skills our industrial operations will require. Industry itself will have to take over that task.

"The industrial manager in the years ahead will find himself giving more and more time and attention to personnel training programs."

When Managers Turn Waiters

Three months without an accident—and employees of Fiberboard Paper Products Corporation's Linoleum Department (Emeryville, Calif.) get a jumbo-sized coffee-and-cake break.

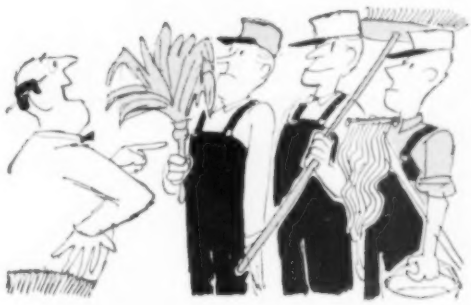
The waiters who serve at these affairs aren't especially skilled, but so far there has been no pressure to hire more professional ones. Workers seem to enjoy having the department's managers do the honors on these occasions.

New Idea in Plant Tours

Detroit industries (46 of them) have given up their right to the whole say on some plant visitors. The 46 participating companies have turned over arrangements for tours by teachers and school children to the Institute for Economic Education, their own organization.

Proof that the joint effort is effective: The UAW-CIO has decided to fight the idea. Says union Education Director Brendan Sexton: "We feel the contacts of the schools should be with the total community and not with any single section. . . We believe the proper way to handle this would be a joint labor-management proposition." The UAW has carried its fight to Detroit's Board of Education, has invited students and teachers to union headquarters (Solidarity House).

See? Management *can* make its point effectively to the public.



Trades Foremen Learn Humanics

Where? In sanitation work, of all places. At Delco-Remy Division of General Motors Corporation (Anderson, Ind.) skilled maintenance tradesmen are often promoted to jobs as sanitation foremen.

Sound like a waste of technical know-how? Not a bit. The sanitation job is a training ground in the art of management. In sanitation work technical problems don't override everything else. Human problems emerge as the biggest item in the supervisory job. And the engineering-minded skilled-tradesmen-turned-supervisors learn valuable lessons in motivation, discipline, labor relations, and human relations. (They learn something of the science of sanitation, too. And it's worthwhile knowledge for any manager in a modern plant.)

Result for the men: According to Kenneth Bowman of Delco-Remy, speaking at the 10th Plant Maintenance and Engineering Show & Conference (Cleveland, January 1959), successful sanitation managers are eventually transferred to supervisory jobs in their original trade. And their work lives are easier and more successful as a result of their sanitation experience.

Result for the company: Maintenance department supervisors have a firm respect for their responsibilities as managers of men. They realize that not all problems are mechanical and electrical.

THIS IS THE WAY

(THE MAGLINER WAY)

You name the loading job—there's a Magliner to solve it the cost saving way! Magliner Dock Boards for truck or rail . . . Dock Extensions . . . Mobile Loading Ramps . . . Delivery Truck Ramps. Magliners do a big job for many companies, and can do the same for you . . . moving your loads between dock and carrier for less money than it's costing you now! *Get all the facts!*

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LOADING RAMPS

FACTORY

BOOKS

By WARREN J. KING, Manager
Features and Departments, FACTORY

How to Cut Plant Damage Losses

Like most handbooks, this one on *Industrial Loss Prevention* covers the waterfront. In a well-illustrated manner it tackles the job of comprehensively covering fundamentals, procedures, and techniques for protecting factories and processes against destruction or damage by fire, explosion, lightning, wind, and earthquake. However, the field is a broad one. So the originators of this volume have had to condense their data in some instances.

There is plenty of helpful information here for the industrial, plant, or maintenance engineer responsible for plant protection. With its 203 tables and 634 drawings, the book gives practical, definite recommendations on many subjects. Covers safe construction, automatic sprinkler systems and water supplies, safeguards for processes involving flammable liquids and gases, protection of high storage values, elimination and control of ignition sources, roof anchoring, earthquake protection, and the like. Also includes a description of latest tested equipment to prevent disastrous conditions. Plus many new methods never before revealed.

This volume was prepared originally as a reference for engineers at the Factory Mutual Engineering Division of the Associated Factory Mutual Fire Insurance Companies. So many facts it includes are available generally for the first time.

Handbook of Industrial Loss Prevention, prepared by Factory Mutual Engineering. McGraw-Hill Book Co., 330 West 42nd St., New York 36. 864 pages. $20.

Autopsy Reports on a Small Company

Management consultant James J. Hickey has collected a complete series of reports on every aspect of the operations of a small company. It's a real company (about 100 employees) that found itself in trouble and had to sell out to a larger outfit. Hickey was called in, went through the operation with a fine toothcomb. His *Management Audit Reports* are a veritable catalog of everything that can go wrong in a small company (or in a big one).

Can't say we agree with all that Hickey proposes to correct the situation as he found it—but that's why the world is so full of consultants. Even forgetting the quality of the solutions, this Baedeker of potential trouble spots can be very helpful to the young engineer or staff assistant—or the manager newly arrived at a strange company.

Last segment in the loose-leaf volume is a "management checklist" of 183 questions. Many appear rather naive when applied to a 100-man company; a few are questionable even for a big outfit. But they should suggest some often overlooked points.

Management Audit Reports, by J. J. Hickey. Kevmar Publications, Stratford, Conn. 137 pages. $20.

LP in Easy Stages

Here's another excellent volume for the non-mathematical plant man who wants to get a good grounding in linear programming. *Elementary Mathematical Programming* is a sound, practical approach to the subject. In our judgment, however, it's a shade more mathematical and not quite so well organized as Ferguson & Sargent's *Linear Programming* (reviewed in Dec. 1958 FACTORY). But it has the advantage of including the Modi and Vogel (or VAM) simplifications, plus the index and ratio approximation methods.

While author Metzger doesn't suggest a direct evaluation of the comparative values of the Modi and VAM methods, his consecutive reports on the two are the first such we have seen. (As one of the "fathers" of Modi, Ferguson had a natural

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You're paying for new trucks...why not own them?

Times change. So does equipment efficiency. The new *Clarklift* fork trucks pictured above, for example, have been tested and proved to be 30% more efficient than the average truck in use today. Over four years of designing, testing, and field-proving has demonstrated time and again that *Clarklift* owners get a fast return on their investment in extra production alone.

And, of course, if you have old equipment, there's the high cost of maintenance to consider. If your present trucks are frequently down for repairs, you're paying dollars not only for the parts and labor involved, but you're also paying for lost production, supply and shipping bottlenecks, poor use of manpower. It all adds up. It means you're paying for new equipment every day . . . *but without owning it.*

A planned equipment replacement program is worth investigating. Simply write: Planned Replacement, Clark Equipment Company, Battle Creek, Michigan. We'll arrange to have a representative call to survey your operation and explain the various programs available.

CLARK® EQUIPMENT

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Workers go for functional good looks

This new Bausch & Lomb safety frame has got it... PLUS

C-20 combination metal/plastic

Newest concept in safety eyewear, designed by Bausch & Lomb to meet the needs of today and tomorrow. Smart, with superior fitting qualities and unequalled strength, C-20 represents the finest in scientific eye protection. Spatula or riding bow temples and Bausch & Lomb Redy-Fit side shields available for on-the-job interchangeability. See it now; call your supplier, or write for information:
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bias; he showed it by avoiding any mention of the Vogel method.) The other spot where Metzger shines is in his bibliography. It's in three sections: relatively easy reading; reading for the mathematically inclined; technical references.

Elementary Mathematical Programming, by Robert W. Metzger. John Wiley & Sons, Inc., 440 Fourth Ave., New York. 246 pages. $5.95.

How to Size 'Em Up

Appraising Executive Performance is a "how to" on setting up realistic yardsticks for measuring executive effectiveness. It's easy reading and covers the field well. The author's position is basically sound, although he tends to stray from specifics and to generalize.

The book covers methods for judging specific managerial skills such as technical knowledge and experience, decision-making, and ability to coordinate and direct other personnel. It tells how to pick the right time for evaluating performance, how to secure top management support and mutual understanding. And it examines ways to relate an executive's personal traits to his job. In all, this is a good picture of executive appraisal in action.

Appraising Executive Performance, by Carl Heyel. American Management Association, 1515 Broadway, New York 36. 189 pages, $4.50.

Coated Abrasives

The entire membership of the Coated Abrasives Manufacturers' Institute has collaborated on a soup-to-nuts treatment of their products. You won't be much interested in how coated abrasives are manufactured. But you may find a good deal of help on the application of abrasives in your business. Also covers recent advances in automatic machinery, coolants, cutting oils, etc.

Coated Abrasives—Modern Tool of Industry, by the Coated Abrasives Manufacturers' Institute. McGraw-Hill Book Co., 330 West 42nd St., New York 36. 452 pages. $8.50.

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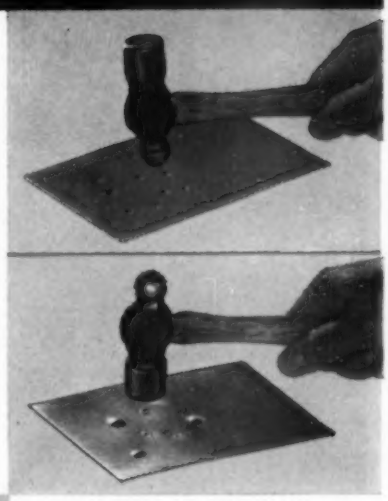

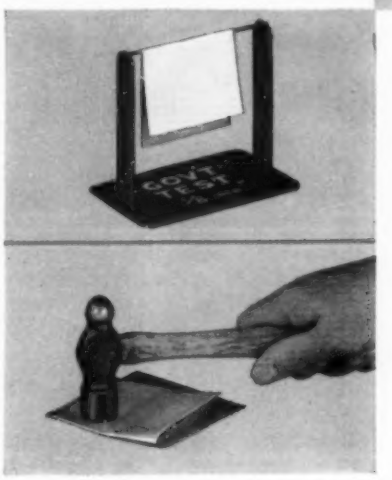

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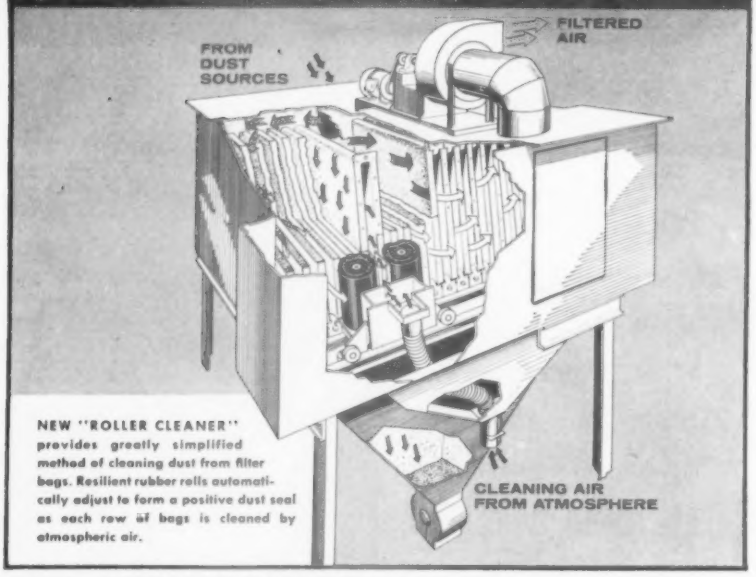
NEW *SLY* DYNACLONE® DUST FILTER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FILTERED AIR
NEW "ROLLER CLEANER" provides greatly simplified method of cleaning dust from filter bags. Resilient rubber rolls automatically adjust to form a positive dust seal as each row of bags is cleaned by atmospheric air.
CLEANING AIR FROM ATMOSPHERE

Patent Nos. 2583039, 2695681, 2867289. Other Patents Pending.

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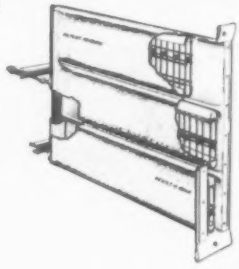

NEW SLY "RESIST-O-WEAR" FILTER BAGS (patent pending) provide complete dust filtration with as much as three times longer life than conventional bags. This has been proved on the toughest field installations.

The new bag has three equal-size sections. Each pocket has two spacers, making a total of six per bag. Weight is distributed on three seams rather than one, minimizing strain. A special protective flap on the back end prevents abrasion from incoming dust.

Now standard in the new "Roll-Clean" Dynaclone, Sly "Resist-O-Wear" bags combine with all the other superior Dynaclone features to assure greatest dust collecting efficiency with unequalled maintenance-free service.

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- New "Resist-O-Wear" bags last as much as three times longer.
- Constant suction at dust sources—complete dust collection.
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- Free-rolling cleaner. Complete dust seal—automatic seal adjustment.
- Greater filtering capacity; smaller space requirements.
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Introduction to Manual Heliarc Welding demonstrates how it works and what it can do. Film shows basic pieces of equipment, how they are "related," and how to make a simple weld. 16mm, sound, color, 8 min. For loan, write:

E. P. Gaskell, Jr., Linde Co., 420 Lexington Ave., New York 17.

Fire Prevention: Know Your Fire Hazards gives information about fire characteristics of various materials and describes the conditions under which they are likely to start a blaze. Runs 18 min. **The Nature of Fire** shows by animation and laboratory-type demonstrations the three essential elements of fire: oxygen, high temperature, and fuel. Runs 13 min. Both films 16mm, color. To purchase, write:

United World Films, Inc. (Government Dept.), 1445 Park Ave., New York 29.

Engineered Screw Machine Tooling Applications are depicted in this new film. Eight uses of the latest design automatic screw machines are shown, with sequences detailing relative position of tooling during close timing operations. Also explains standard and special attachments. 16mm, color, sound, 35 min. For loan, write:

Brown & Sharpe Mfg. Co., Machine Tool Div., Providence 1, R. I.

Rescue Breathing dramatizes methods of saving lives of victims of suffocation by electric shock, chest injuries, choking, gas or other cause. It teaches the techniques of mouth-to-mouth or mouth-to-nose rescue breathing. 16mm, sound, color or black and white, 21½ min. To purchase, write:

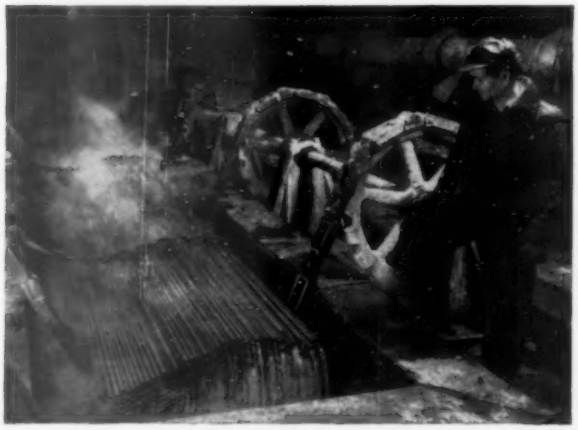
American Film Producers, 1600 Broadway, New York 19.

A Citizen's Political Responsibility is the subject of this film-strip. It presents various aspects of the political structure; then takes up step by step the citizenship obligations of every individual to prove that "government is your business." Sound, color, 20 min. To purchase, write:

The National Education Program, 815 Center St., Searcy, Ark.

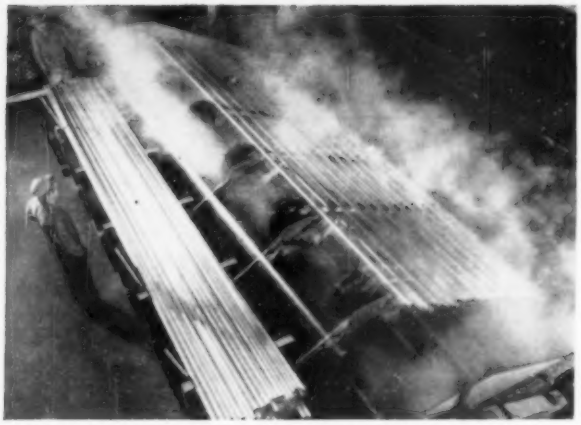
These 4 steps show why SPANG brings you the best galvanized steel pipe!

THOROUGH CLEANING of the pipe before galvanizing removes all dirt, grease and scale, leaves a clean surface for the prime western zinc galvanized finish.



STEAM-WIPING of the pipe's exterior, as it comes from the kettle through an air ring, produces a smooth even finish that will stand up under rough usage.

SUPERHEATED STEAM blown through the pipe interior removes excess zinc inside, assures a smooth uniform surface for easy flow of liquids.



QUICK QUENCHING of the pipe in a sodium dichromate solution bonds the galvanized finish to the steel, adds extra service to the life of the pipe.

This is just part of the *quality-control* processing that each length of Spang Steel Pipe receives. Careful control from skelp through the inspection tables assures you of a *top-quality* pipe for *top-quality* installations. Next job, make it steel pipe . . . make it Spang! Your local Spang Distributor is at your service!

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HOW BASIC DATA ARE DERIVED

PERIOD TESTED	JOB TIME (HOURS) 0.1-1.9	2.0-3.9	4.0-7.9	8.0-15.9	16.0-31.9	32.0-49.9	50.0 & Over	GRAND TOTALS
A — TOTAL HOURS								
3 months	1396.7	1540.0	2324.5	2606.1	3063.9	2606.0	10823.7	24360.9
3 months	1352.8	1589.0	2216.8	3084.2	3447.8	1894.9	7766.0	21351.5
TOTAL	2749.5	3129.0	4541.3	5690.3	6511.7	4500.9	18589.7	45712.4
B — NUMBER OF JOBS								
3 months	1509	559	420	238	137	67	108	3038
3 months	1443	571	396	279	155	49	80	2973
TOTAL	2952	1130	816	517	292	116	188	6011
AVERAGE	1476	565	408	259	146	58	94	3006
C — AVERAGE JOB TIME IN HOURS								
3 months	.93	2.75	5.53	10.95	22.36	38.90	100.22	
3 months	.94	2.78	5.60	11.05	22.24	38.67	97.07	
AVERAGE	.94	2.76	5.56	11.00	22.30	38.78	98.64	
D — PERCENTAGE OF TOTAL JOBS DONE								
3 months	49.67	18.40	13.82	7.83	4.50	2.21	3.55	
3 months	48.54	19.21	13.32	9.38	5.21	1.65	2.69	
AVERAGE	49.10	18.80	13.57	8.60	4.85	1.93	3.12	
E — PERCENTAGE OF TIME SPENT IN EACH GROUP								
3 months	5.73	6.32	9.54	10.70	12.58	10.70	44.43	
3 months	6.34	7.44	10.38	14.44	16.15	8.87	36.37	
AVERAGE	6.03	6.88	9.96	12.57	14.36	9.78	40.40	

FOR THIS MAINTENANCE INCENTIVE PLAN YOU NEED ONLY A BASIC HISTORICAL DATA SHEET . . .

Simpler Maintenance Incentive

This bonus plan makes everybody happy. It covers all maintenance workers, gets more work done in less time, is easy to run, costs little to administer.

WEEKLY BONUS payments make the maintenance incentive plan here at Bay State Abrasive popular with workers and management alike. And our plan has 100% coverage. It includes every maintenance worker in all crafts—some 50-odd men—electricians, plumbers, millwrights, carpenters, masons, sheetmetal workers, painters, and what-have-you.

As you will see, we couldn't want anything simpler. Installation cost was negligible. Administrative costs are light. No estimator is needed. And the plan is easily understood by the workers. Also, group cooperation is encouraged because all men get the same bonus.

This plan has been working successfully since December 1954. Bonus payments have been steady, ranging from a high of 29% at the start to 23% as of the end of 1958 (and a low of 16%).

Old way—We used to have a plan based on standard data developed by time study. We ditched it because:

Each craft group was on a separate bonus. This is a natural cause for dissatisfaction with differences in earnings among groups. Also coverage was not 100%. For example, we were able to develop adequate and reliable standard data for plumbers, carpenters, painters, electricians, and sheetmetal trades. But many jobs handled by our millwrights and machine repair group were tough to figure, even by the checker (post-set method). Our one estimator was often hard put to justify his job standards. It would have meant more expense to improve the standard data, plus an increase in administrative costs.

So despite our conviction that the old method was sound for maintenance employees, it was hard to apply and costly to administer.

By RAYMOND H. TOLMAN
Manager, Industrial Engineering
Bay State Abrasive Products Company
Westboro, Mass.

HOW RATES ARE SET UP

GROUP	R RATE (Hrs.)	P % JOBS DONE	F FACTOR
0 - 3.9 hours	1.44	67.9	0.98
4 - 7.9 hours	5.56	13.6	0.76
8 - 15.9 hours	11.00	8.6	0.95
16 - 31.9 hours	22.3	4.85	1.09
32 - 49.9 hours	38.8	1.93	0.75
50 hours and up	98.6	3.12	3.08
		Composite factor	7.61

HOW BONUS IS CALCULATED

Step 1. Number of jobs completed this week 230

Step 2. Actual hours worked by maintenance group 1250

Step 3. Computation of earned hours:

Detailed way: 230 x 0.98 = 226
x 0.76 = 175
x 0.95 = 219
x 1.09 = 251
x 0.75 = 173
x 3.08 = 708
TOTAL 1752 earned hours

Summary way: 230 x 7.61 = 1750.3

Step 4. Computation of performance: $\frac{1752}{1250} \times 100 = 140\%$

Step 5. Computation of worker share of improvement: $\frac{40}{2} = 20\%$

Step 6. Computation of bonus:

$$\frac{20 + \text{sum of share of 7 previous weeks}}{8} = \% \text{ for current week}$$

PLUS A RATE SHEET AND A BONUS CALCULATION SHEET.

New way—Our new incentive plan is based purely on past performance records as opposed to time study. It's designed to pay off on a 50-50 split for performance over 100%. Performance is measured on the basis of the time it takes to do a week's quota of jobs as compared with the historical standards. The more jobs the group does in less time, the better the bonus.

The job standards are calculated *en masse* for each week after the work is done. We have yet to find a reason to revise the basic standards. Methods of derivation, calculation, and application of these standards are shown in the three tables above.

GATHERING DATA

The data (Basic Data Sheet) are our past performance figures from the entire maintenance department. Principle of the plan is first to find the average time per job for all work falling into a series of job-time categories, namely 0-1.9 hours, 2.0-3.9 hours, 4-7.9 hours, 8-15.9 hours, 16-31.9 hours, 32-49.9 hours, and 50-up hours. Then to find what percentage of all jobs done lies in each of these categories. There is no need to separate jobs by types or crafts.

At Bay State this analysis was no problem because each maintenance man punches in-out time on all jobs he does. We analyzed our records for two consecutive 3-month periods (beginning in April and July 1954). Total Hours (A) and Number of Jobs (B) were a matter of sorting the time cards for each category. Average Job Time (C) was obtained by dividing items in (A) by their respective items in (B). Percentage of Total Jobs Done (D) in each category was obtained by dividing the sub-totals in each category in (B) by the grand total in (B), extreme right column. Percentage of Time Spent in Each Group (E) was similarly derived from (A).

It's interesting to note how closely the figures for each of the two 3-month periods agreed. This gave us the courage to state that a 6-month past history was a valid representation of our cross-section of maintenance work. So we simply averaged the two periods and came up with a combined figure for six months.

SETTING UP RATES

The standards of past performance can now be set up in a simple Rate Sheet (left) applying to each job-time category. Rate (R) and Percentage Jobs Done (P) are taken directly from (C) and (D) of the Basic Data Sheet.

In compiling this rate sheet we simplified the bonus calculation by combining the lowest two job-time categories of 0-1.9 hours and 2-3.9 hours into one of 0-3.9 hours.

The factor F is what we're after. It's the product of R multiplied by P. When applied to the maintenance group's record for any calendar period it evaluates performance against the historical standard.

FIGURING THE BONUS

The hypothetical case (Bonus Calculation Sheet) shows how to calculate the bonus. In Step 1 we determine the number of jobs worked on in one week, including incompleted jobs (a negligible part of total) and all routine jobs—such as lubrication. In Step 2 hours spent on incomplete jobs are omitted, carried over to the following week. Computations in Step 3 can be handled by a long or short way. For either way the factors used are the F values derived in the Rate Sheet. We prefer to do this calculation both ways—as a double-check and as an informative breakdown for future review. Steps 4 and 5 follow logically. The sole purpose of obtaining a running average of 8 weeks in Step 6 is to level out the peaks and valleys of performance, soften their impact. It does not affect gross payment.

Then how do you determine the very first eight bonus payments? You pay the first one as calculated—and calculate the following ones on a running average of previous figures until you reach an 8-week accumulation. Thereafter you drop the earliest of 8 weeks.

Turn the page

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- Installation costs and time are drastically reduced.
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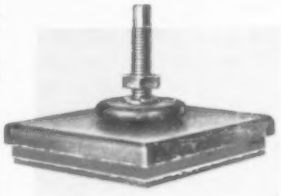

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FE9-4

MAINTENANCE INCENTIVE

Begins on page 170

After four solid years of service, only one improvement in the plan seems worth considering. It would be to use our present standards to analyze all jobs and to pre-set time standards on each order. This would require analyst-type estimators—possibly two—to provide complete coverage. But the cost, we estimate, would be more than offset by the gains in productivity and faster completion of work.

How FACTORY Sees the Plan

By Carl G. Wyder, FACTORY

This plan evidently works well. It provides all the advantages of the so-called historical method of work measurement. It was among the methods discussed in "Work Measurement in Maintenance" (FACTORY, January 1955).

In that article we listed certain shortcomings of the historical method. As they are on record, FACTORY editors asked Raymond Tolman, author of this article, if he would agree to cite his experiences on a few moot points and let us publish them. He agreed. And here they are, in form of questions (heavy type) and answers:

Valid weekly computations depend on how well present conditions represent conditions of the initial survey made to determine "What is a job?" Won't any shift in cross-section of values R or P (Rate Sheet) change the value of F?

Whatever was a job in 1954 is still a job today. Remember, jobs are not created by the people who are on incentive. They usually originate with the production foremen, who, incidentally, get copies of all completed orders and thus know exactly what charges they pay.

Has the factor 7.61 held continuously for four years until now?

We do review the bonus periodically. And we review the proportions of jobs falling into the various job-time categories annually. As yet we have not had to revise this 7.61 composite figure. It has worked very satisfactorily.

Turn the page

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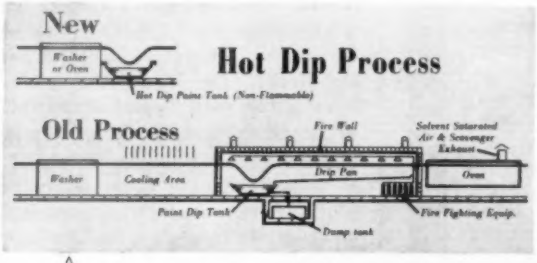
Revolutionary Hot Dip Process.
David-Ludwig Company solves your PAINT FINISHING problems.

This hot dip process has greatly simplified paint dip operations with resultant savings in *paint usage, floor space* and *initial cost*. The process consists of preheating the article and dipping it into a paint operating at 160° F. Leaving the tank the solvent is instantly evaporated from the paint by the heat radiating from the article. This provides *quick drying, uniform thickness* and *drip-free coat*. Since the solvent used is trichlorethylene the system is *fireproof*, providing *safety* for plants and employees. Contact A. D. Ludwig, Vice President, for additional information.



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Quick case history—reading time 42 seconds

How 2560 tons of cooling equipment resist corrosion with Hagan CS

THE PLANT: 42-story office building at 525 William Penn Place, Pittsburgh. Hot-chilled water circulating systems contain steel risers, copper runouts, brass automatic valves; air condition 13,500,000 cubic feet of office space; circulate 14,000 gallons of water.

THE PROBLEM: Find a corrosion-inhibiting chemical to protect these 2560 tons of refrigeration machinery. Chemical must be effective for both ferrous and non-ferrous metals, easy to handle, easy to feed, non-injurious to packing or pump seals, non-staining to painted surfaces should closed loops leak.

THE SOLUTION: Hagan Corrosion Inhibitor CS meets all specifications; is added through conveniently located pressure pot feeders. Simple colorimetric control test tells when to add to compensate for minor leakage through glands and packings. The hot and chilled water systems treated with CS have required practically no maintenance.

TEST RESULTS: Standard 1 x 2 inch pre-weighed corrosion test specimens installed at critical locations throughout system showed these typically low corrosion rates (mg/dm²/day) after introduction of CS Inhibitor:

Steel:	0.010
Copper:	0.004
Brass:	0.008

FOR FULL INFORMATION on how economical Hagan Corrosion Inhibitor CS can help keep your closed water system corrosion free, write for Bulletin 410-12-3.

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DIVISIONS: CALGON COMPANY, HALL LABORATORIES
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FURNAS

FURNAS ELECTRIC COMPANY

BATAVIA, ILLINOIS

SALES REPRESENTATIVES IN ALL PRINCIPAL CITIES

MAINTENANCE INCENTIVE

Begins on page 170

How do you know?

First, it hasn't been too tight a rate because the men have continually made a fair bonus. Second, it hasn't been too loose because work-sampling observations indicate the men still have to do a fair day's work to earn the bonus.

Your plan makes no provision for adjustments for technological improvements or other reasons for productivity changes. Won't the maintenance men reach a peak at which the amount of incentive is stabilized? Or won't the bonus steadily rise until it's out of control?

As yet the pattern of our bonus payments doesn't indicate that either of those eventualities is likely to occur. If they ever should develop, however, we have an agreement that management has the right to review or terminate the incentive bonus at any time.

How do you prove, if and when necessary, that workers haven't created all the improvement?

Each improvement that management makes—whether tools, equipment, material, or better planning—is recorded. One copy goes to industrial engineering, another to the maintenance workers involved. Thus we tell workers about every change. And they know all changes are accumulated for action when they become significant. Improvements that the worker makes—which could only be in method and better planning—are his. This is one of the ways to make his bonus.

What happens if a supervisor either innocently or deliberately breaks down a large job into separate smaller orders?

The chances of such splitting of jobs are remote. Our foremen are salaried and they earn a cost-saving bonus. So they are always looking for ways to save money for the company. Also our general maintenance foreman screens all work orders weekly as the work is distributed for planning by the foremen. Moreover, such planning would group together two or three orders on the same machine for a specific craft, if orders come in that way. **END**

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For more facts Circle 544 on Reader Service Card ➤

Gets 40% savings in coolant costs by change to

Standard's Transparent Coolant

ARGON Oil No. 4

Chicago Saws, Inc., realizes other benefits in switch to this Standard Oil product

Situation: It all started when a Standard Oil lubrication specialist recommended ARGON Oil No. 4, Standard's transparent coolant to Chicago Saws for use in their grinding operations. This manufacturer of rotary saw blades decided to give it a try. They knew the product was the result of more than three years' work in Standard's research laboratory, and that it had been extensively field tested.

What happened: Using ARGON Oil No. 4 in 100:1 concentration, Chicago Saws was able to reduce coolant costs 40%. They also found the work could be seen more clearly when using this coolant. There was less wheel loading. They also discovered the coolant didn't foam and that its exceptional ability to carry off heat resulted in cooler operation. Faster cuts were obtained with finer wheels. Tolerances were easier to hold. Better finishes were obtained. Less frequent wheel dressings were required.

What you can do: Get more information about ARGON Oil No. 4 transparent coolant. Call the Standard Oil lubrication specialist near you in any of the 15 Midwest or Rocky Mountain states. Or write: **Standard Oil Company (Indiana), 910 South Michigan Avenue, Chicago 80, Illinois.**

Using ARGON Oil No. 4, Chicago Saws gets better finish at savings of 40% over other coolants tried. Operator is using .004" cut on heat treated Rockwell 60 C steel.

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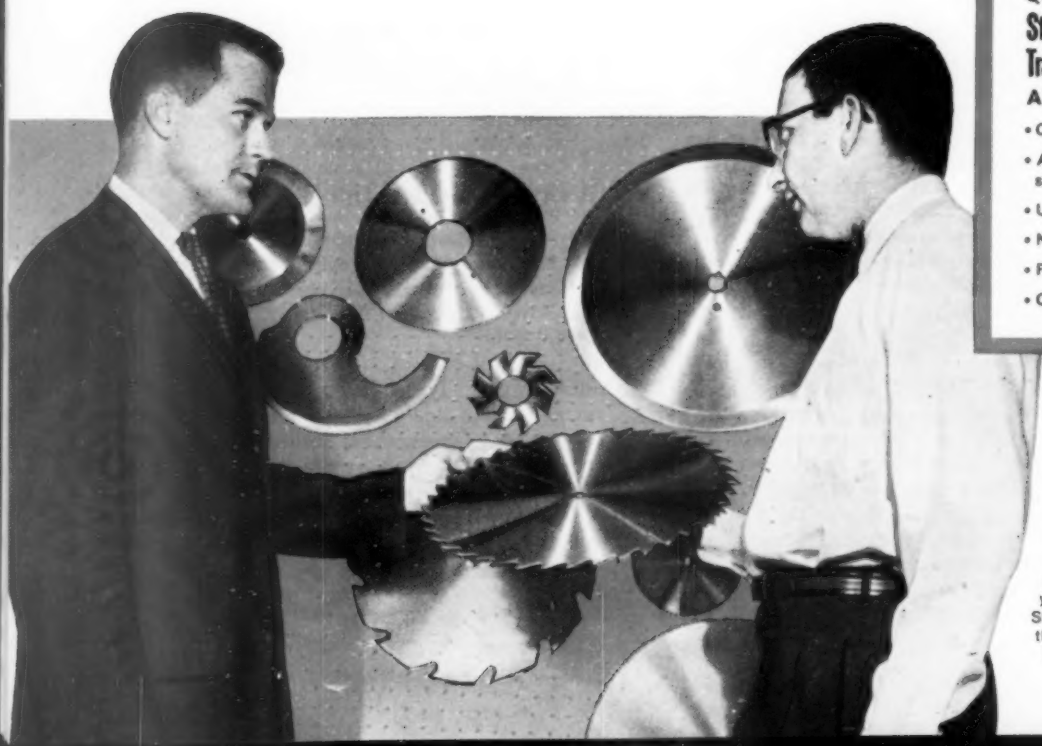

Quick facts about

Standard's Transparent Coolant

ARGON Oil No. 4

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- All chemical. Does not support bacteria growth
- Unaffected by humidity
- Nonfoaming
- Fire resistant
- Odorless

Standard's Bob Stark and Chicago Saws' vice president Paul Bostrom discuss blades and coolants. Bob Stark is well qualified to work with manufacturers on the use of metalworking coolants. Bob has a chemistry degree from Illinois College plus three years' experience at Standard. He has completed the Standard Oil Sales Engineering School course.

By PAUL A. KING, Attorney, Bigelow-Sanford Carpet Company, Inc.; Member, New York Bar

Can Employees Bypass the Union?

Joining a union makes some individual employee rights subsidiary to the terms of the union agreement. But it doesn't affect all of them.

An employee is unfairly fired! Suppose the union refuses to process his grievance? Can the employee sue his boss for damages and collect? Or must he try arbitration first? Whatever legal reason may lie behind it, the answer is clear: An employee *can* sue his employer on a collective bargaining contract.

One school of thought puts it on the basis that a union contract is entered into for the benefit of a third party, the employee. A third-party beneficiary relationship is created, as the lawyers say. The employee's own hiring contract is subsidiary to the terms of the trade agreement.

Another school of thought, although coming out at the same place, says that a "contract for the benefit of a third person may be too tidy a phrase to apply to the complicated employer-union-employee relationship." It prefers the more obtuse "a collective agreement may be assimilable to a legislative enactment."

Whichever reason appeals to you, the Fifth Circuit Court of Appeals at New Orleans again affirms the rule that: "Most courts will allow an individual employee to sue his employer to enforce personal rights that the employee derived from a collective contract." At this point, the court is saying that individual employees have standing in court . . . despite the union's also having the right to sue in court.

But this doesn't answer the question. Does the employee have to use the grievance procedure before going to court? In the case before the circuit court in which all this came up, one employee who was discharged for fomenting a wildcat strike took to the union with his grievance, was turned down flat. Another, fired for the same reason, didn't bother to go to the union. He thought it futile. The court agreed with him. Both were awarded damages.

But suppose there was no evidence of futility? In discussing the case, three New Orleans Circuit Court judges laid down these clarifying principles: "Grievance procedure is appropriate if an aggrieving employee challenges his suspension or discharge with the hope of reinstatement and continuance of his former employment status. In a suit for specific performance, reinstatement, protection of seniority rights, cases in which the employment relationship has not terminated, primary resort to grievance procedure is logical and proper and should be a prerequisite to an employee's filing suit. But a discharged employee may have a common law right of action for damages for breach of contract. He does not lose this right if he elects to use the courts instead of employer-union arbitration channels."

In another case—a recent Maryland case—the employee sued the employer for severance pay. This time the union was willing to arbitrate—but not the employer. Concluded the court, "Plaintiff has exhausted her remedies under the Labor Agreement and has a right to maintain this suit." It skirted the question of what would have happened had both union and employer been willing to arbitrate and the employee still chose to bypass the grievance procedure in favor of court action.

Holiday Pay Requirement

To avoid holiday stretching, employees are required to work the day before and after the holiday to qualify for holiday pay. But suppose the employee were sick the day before?

The Tuttle and Bailey Company of Connecticut said "no pay" for a worker who was home the day preceding New Year's with an injured finger. There was no question about the validity of his injury. But the contract read: "The employee must work a minimum of five hours on the regularly scheduled workday both preceding and following the holiday unless his inability to do so is because of death or illness in his immediate family . . ."

The union considered the employee a member of his immediate family and so did the Board of Arbitration. "But the use of this term in collective bargaining agreements has a special limitation and is limited in its inclusion to the members of the family other than the employee." Pay was denied.

No Work Spells Discharge

Surest way of horrifying an employer is to tell him that he doesn't have the right to fire employees for economic reasons. One union argued this way—but fortunately for the employer, it lost the arbitration.

The average union contract sets out three methods of termination: (1) layoff, (2) discharge for cause, (3) a voluntary quit. The situation faced by Asa Brothers Company, Inc., didn't fit any of these categories. A range in one of its greenhouses needed modernization, but fixing it up right away wasn't in the cards—dollar-wise. Asa decided to put it off for several years. In the meantime, it fired the range workers and gave them severance pay and accrued vacations as called for in the union contract.

The union didn't see eye-to-eye on this question. Claimed the employees should have been laid off. Laid-

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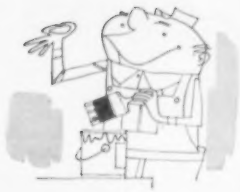

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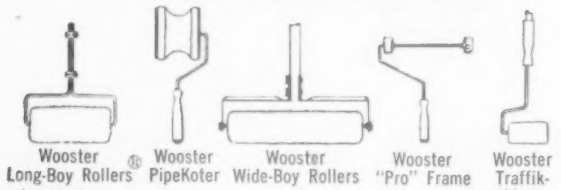

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Begins on page 176

off employees have recall rights, get holiday and vacation pay and insurance benefits. The union couldn't find any clause in the contract allowing the company to *fire* for economic reasons. Neither could the arbitrator. But based on reason, he ruled in favor of the company. What would be the purpose of termination pay if the employer couldn't discharge for this type of reason? Certainly not to reward employees who quit.

Severance Pay Rules

Can your non-union employees—foremen, supervisors, clericals, for example—take you to court (and win) for failure to give them termination pay? In New York State the answer seems to be "yes."

The American News Company gave up its wholesale periodical department. About 1340 former employees took the company to court claiming severance pay. When the legal skirmishes were over and the smoke of battle cleared, the Appellate Division ruled that terminated employees have a cause of action against the company if (1) the company had a past practice of making severance payments, and (2) the employees relied on this practice in accepting or continuing employment. The case was sent back to the lower courts to get the facts.

Some employers with written policies on the subject try to protect themselves by tagging on a provision of this kind: "This policy does not constitute a contract with any employee and may be amended or withdrawn by the company at any time for any reason without notice to the employees." This is decidedly unpersonnel-like, especially if you put it in big print as it should be, but it may possibly be of help in such a situation.

Changing Pay Day

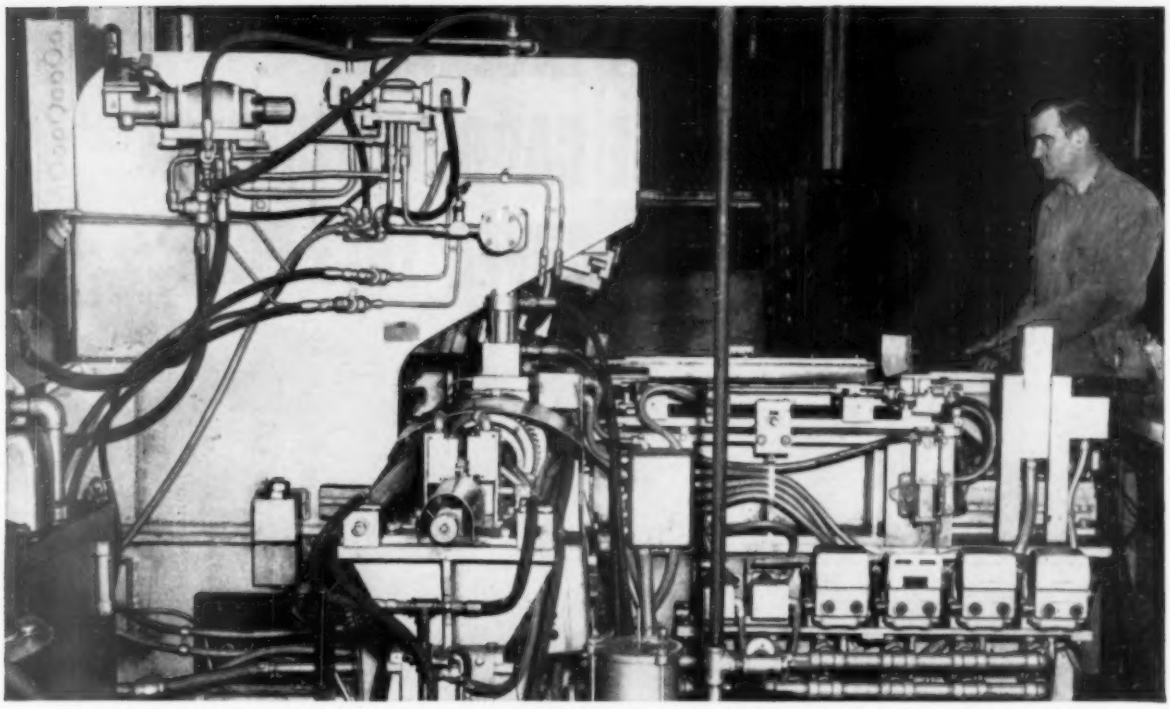
An employer can change the details of his pay-day arrangements, ruled this arbitrator.

Kennecott Copper Corporation paid clerical and technical employees on the 1st and 16th of each month covering the period immediately preceding these dates. Trouble with this was that the pay for the last few days often turned out to be too much or too little—adjustments had to be made later on.

To avoid this costly bookkeeping, the company made pay day the 5th day after each pay period.

The union wailed it couldn't do this. But the best argument it could conjure up was that the contract said employees were to be paid on a "salary basis." The devious reasoning that followed led the arbitrator to rule for the employer. He said the union's position was tantamount to saying that if the employees were paid with pink envelopes tied with blue ribbons at the time the contract became effective, the employer was obligated to follow this practice. A *non-sequitur*, ruled the arbitrator. The arbitrator received his fee from the union in—you guessed it—a pink envelope tied with a blue ribbon.

Turn the page



This machine rolls and welds muffler shells. Hydraulic pressure and return lines are Aeroquip Flexible Hose Lines which replaced rigid tubing.

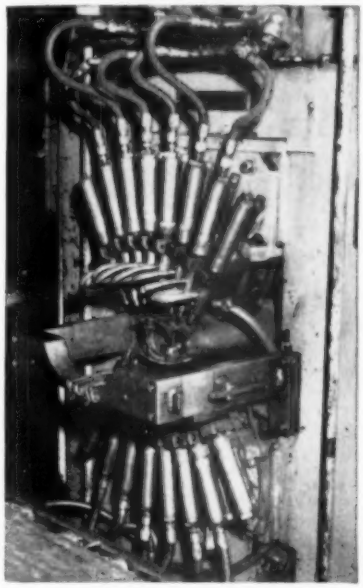
Hydraulic Line Leakage Problems Solved With Aeroquip Flexible Hose Lines

at Walker Michigan Division,
Walker Manufacturing Company of Wisconsin

Semi-automatic metal forming and welding equipment is used at Walker Michigan Division's Jackson plant in the production of automotive mufflers. On equipment using rigid tubing, leaking hydraulic lines were a common maintenance problem. Tubing failures were caused by vibration of the equipment during operation.

Walker maintenance men solved this problem by replacing rigid tubing with Aeroquip Flexible Hose Lines. Assembled quickly in the plant using Bulk Hose and Reusable Fittings, these replacement hose lines have given long, trouble-free service.

If you have a fluid line problem of any kind, you can rely on your local Aeroquip Distributor to help solve it. He's a fluid line specialist. Call him today, or write us.



Aeroquip Hose Lines on this multiple transformer welder have given long, leakproof service since replacing steel tubing. Walker maintenance men keep a supply of Aeroquip Hose and Reusable Fittings on hand to replace tubing when needed.

Aeroquip

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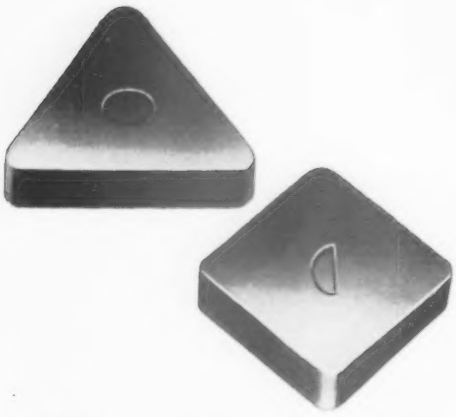

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Begins on page 176

Complex Question

Sophisticated personnel managers often maneuver their grievances so that each one is heard by a different arbitrator. Reason? Avoids trading-off of awards, assures handling on the merits. But does it?

There's no sure answer. No arbitrator will admit to the nefarious practice of handing an award or two to the union just to sweeten the pot. But there are some labor relations specialists who say it's being done from time to time. It seems to be a human enough tendency to warrant careful consideration. However, we know that employers will sometimes process grievances which they should have dropped short of arbitration merely for the sake of giving the arbitrator a chance to throw a bone to the union.

Both these questions are matters of personal judgment and morality, a great deal depending upon the union, the rank and file, and employer-union relationships. (A recent survey of the American Arbitration Association showed that 74% of submissions to arbitration are for only one case.)

Simple Answer

The personnel manager who is faced with a lot of grievances ripening into arbitrations at about the same time will have a tough time preventing one arbitrator from hearing all of them at one sitting—if the union insists.

His only hope is language in the contract giving him the specific right to limit an arbitrator's jurisdiction to one case. It wasn't long ago that Black-Clawson Company, Inc., struggled hard with this problem and lost its cause of one case per arbitrator. It cited past arbitration practice, contract negotiation history, custom and practice in the industry and area.

In spite of its efforts, this company was effectively batted down by the arbitrator—on the facts. He said: "In the absence of a clear and unambiguous provision authorizing a single arbitrator for each grievance, and in the absence of any past arbitration history or contract negotiation intent or history that would allow that conclusion, the agreement should be interpreted to require the submission of all grievances ready for arbitration to one arbitrator at a single hearing." There's this consolation. It's generally cheaper that way.

Moonlighting Okayed

An employee's private life is just that—private—unless what he does adversely affects his company. Holding down a job with a competitor might be adverse—but here it wasn't, said an arbitrator.

Hard-pressed and eager-to-work employees look at overtime as a means of bringing home more bacon. When the Branch River Wool Combing Company (Woonsocket, R. I.) cut out overtime, this employee picked up a second job to fill the gap. All might have gone well were it not that he picked a job with his company's competitor. Ordered to give up his second employment, he chose discharge and the grievance pro-

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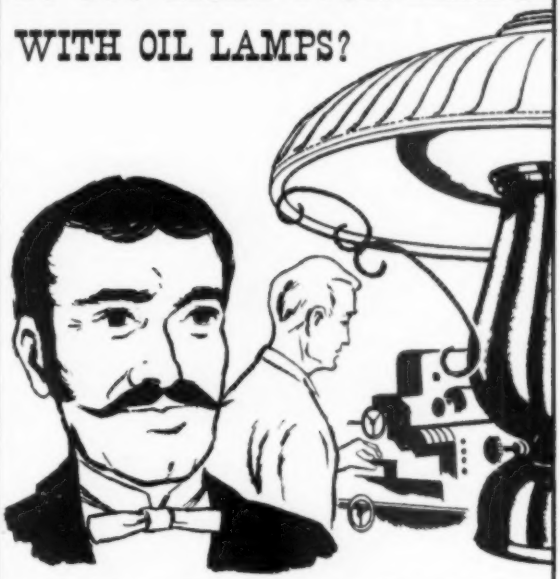

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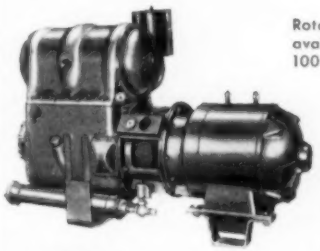

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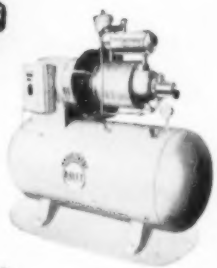

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cedure. It proved to be a lucky choice. Arbitrator Paul Pigors told his employer to take him back. He said that discharge would have been okay here only under these conditions:

1. If the company had a consistently followed rule forbidding work with a competitor.
2. If the employee had revealed company secrets.
3. If the second job had a bad effect on his production record.

Other arbitrators have not always agreed with Pigors. Companies are well within their rights when they rule against moonlighting with competitors. There's something unfair about a competitor cashing in on your training, know-how, and experience.

Fifth Amendment Takers Fired

Taking the Fifth Amendment is just cause for discharge under the law, ruled this court.

Three employees of the Westinghouse Electric Corporation pleaded the Fifth Amendment at hearings before the Committee on Un-American Activities of the House of Representatives. Testimony had been given that they were Communists. Westinghouse fired the three. The union complained that the discharges were without just cause—would have the question go to arbitration as would normally be the case. The company refused.

The New York Supreme Court supported the company. The discharge, it pointed out, was just cause as a *matter of law*. The refusal of the three employees to answer questions cast a doubt on their trustworthiness and reliability. Going to arbitration would be pointless. "The three employees were perhaps within their constitutional rights in refusing to answer the questions put to them. And they have a constitutional right to their warped political beliefs, but not to employment."

* * *

Workers correct errors. Called upon to put up or shut up, the International Brotherhood of Electrical Workers put up and enforced a clause in its contract with the Electrical Contractors' Association by sending 300 members back to their jobs to correct faulty work on their own time. It was a provision of the union contract.

Secret votes are few. Out of 111 unions representing 96% of the organized workers, only 31 require election of international officers by secret ballot, the Bureau of Labor Statistics discovered.

Law book for oldsters. "Legal Problems Facing the Older Citizen" is the name of a leaflet put out by the North Carolina State Board of Welfare, P. O. Box 2599, Raleigh, N. C.

Tax book for internationals. For personnel departments that send employees abroad: "Tax Guide for U. S. Citizens Abroad." Issued by the Internal Revenue Service, it indicates what income earned abroad may be exempt from income tax.

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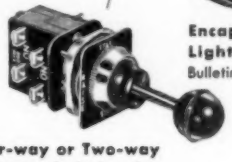

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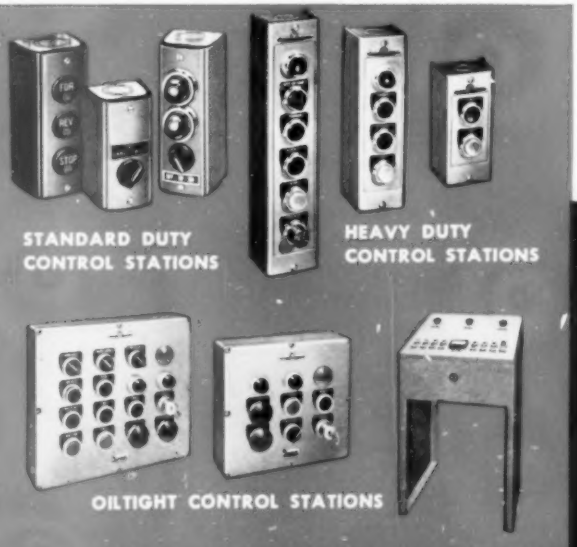

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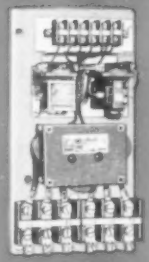
For Phase Failure



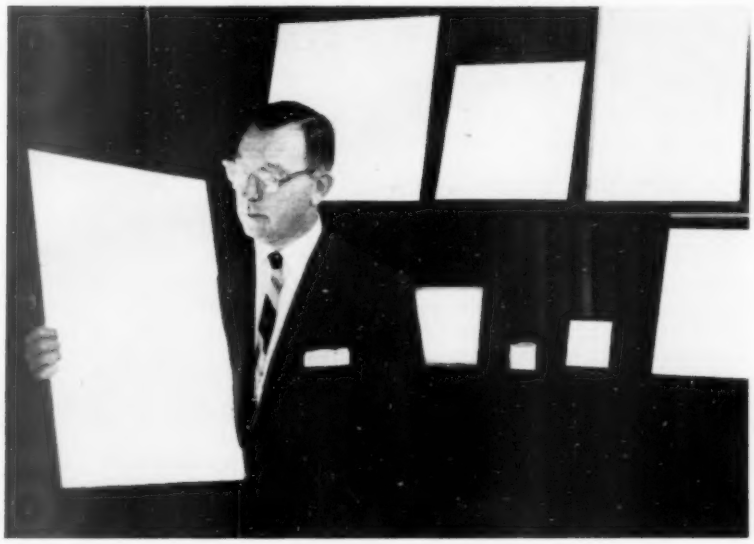
Style F covers full load currents from 1.5 to 300 amp in 4 sizes. Coils for up to 600 v, 60 cycles.

For Phase Reversal

Style R made with coils for 110, 208/220, 440, 550 v for either 50 or 60 cycle operation.

FACTORY MATERIALS NEWS

For more about these items, circle numbers on Reader Service Card next to back cover.



Now—Light From Flat Bulbs

What's the newest thing in lighting? Flat light "bulbs."

These electroluminescent lamps give off little heat, use a negligible amount of electric current, and produce a diffused light without special fixtures or baffles.

The thin, flat shape makes the lamps useful in difficult lighting applications. They are being made as dials and indicators with scales and other markings imprinted right on the glass surface. (Markings, data, etc., are silk-screened on the glass before processing.) The lamps are sealed around the edges and coated on the back with protective plastic to provide a moisture barrier. They're available in standard sizes from 2- to 24-in. square, can be made in various shapes in the same sizes. Lamps come in green, blue, yellow—the green gives greatest brightness.

Westinghouse Electric Corp. (Circle 251).

Nylon Cylinders Are Giant Size

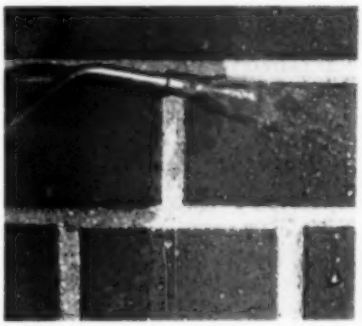
Here's a nylon cylinder said to be the largest monolithic nylon shape ever manufactured. It's 21-ft. long with 16-in. outside and 13-in. inside diameters; weighs over 700 lb. Applications: primarily as roller coverings requiring nylon's abrasion resistance and resilience. Also used as rollers for embossing, coating, or similar processing of sheet material. New shapes can be made in special nylon formulations with characteristics tailored to specific end-use requirements.

The Polymer Corp. (Circle 252).

253—Low Carbon Flat Stock, precision-ground, is useful for wide range of tooling and parts applications. This "thrift" stock comes in sizes from $\frac{1}{16}$- to $2\frac{7}{8}$-in. thick, up to 16-in. wide, all 24-in. long, in 250 combinations of dimensions. *Brown & Sharpe Mfg. Co.*

254—Volatilizing Flux is for brazing various "hard-to-braze" materials in hydrogen or dissociated ammonia atmospheres. Available as solution or as powder for mixing with brazing alloy and Nicrobraz cement. Volatilizes during brazing—no residue. *Wall Colmonoy Corp.*

255—Self-Supporting Suspension system, with concealed grid, has been developed especially for access acoustical tile. System gives flexibility in recessed lighting and partition location—in relocation as well as in original installation. *Owens-Corning Fiberglas Corp.*



Keeps Masonry Bright

This water repellent helps masonry keep its original "sparkle." The material can be diluted with plain mineral spirits. Repellent 770 is clear as water, and as effective on mortar as it is on brick, concrete, or other masonry. Tests have shown long service life of masonry treatments, with water resistance lasting over five years.

Dow Corning Corp. (Circle 256).

Turn the page

For more about these items, circle numbers on Reader Service Card next to back cover.

257—Panel Construction Component, called Alply, consists of expanded plastic beads "sandwiched" between sheets of aluminum. Is said to simplify and save costs in the design and construction of buildings and appliances; other applications. *Aluminum Co. of America.*

258—Stainless Steel Rings and disks are machine-cut to size. Their close tolerances and smooth edges make them suitable for many applications without further processing. Additional machine work, if needed, can be done before shipment. *Joseph T. Ryerson & Son, Inc.*

259—Fire Hose won't deteriorate even though it is soaked continuously in mud holes, kept in damp underground mines for months, or hung in heavy atmosphere of acid fumes. Material can withstand more than 500-psi. pressure test. *B. F. Goodrich Industrial Products Co.*

260—Foaming Insulation System uses polyester resins in combination with refrigerants to produce a low "K" factor, rapid cure, foam-in-place insulation. Material is self-adhering to many substances, has sound-dampening properties, is non-friable. *Pittsburgh Plate Glass Co.*

261—Translucent Building Panels, called Sanpan, are made from fiber-glass-reinforced polyester skins bonded to heavy extruded aluminum frames and internal grids. Panels are light in weight, easy to install. Come in variety of sizes and colors. *Panel Structures, Inc.*

262—Stainless Steel, in a strong, hard, erosion-, corrosion- and heat-resistant alloy, is available as forging billets and rounds from ⅜- to 3-in. in size. Steel is non-magnetic; can be used at temperatures of 900 to 1600 F. in many applications. *Armco Steel Corp.*

263—Lead Vinyl is a new type of shielding material for radiation protection. It's lighter in weight than conventional lead rubber and has sanitary, non-absorbing smooth surface. Standard thicknesses have 0.25-, 0.05-, and 1.00-mm. lead equivalent. *Bar-Ray Products, Inc.*

264—Fire-Stopping Paints perform double fire-protection duty. How? By chemically stopping spread of flames and insulating building interiors against effects of spreading heat. Paint withstands 1700-deg. flames for up to one hour. *Baltimore Paint & Chemical Corp.*

265—Etch Finish, called Alsite, gives a decorative finish to aluminum and aluminum alloys by immersion. Provides a base for lacquering, anodizing, chromatizing, or other proprietary aluminum finishes. Powdered material is soluble in cool or warm water. *Kelite Corp.*

266—Glass Insulation, called Foamglas "Stay-Dry," is a covering for hot and cold piping. Material can be installed before or after the pipe is hung. Comes in 24-in. lengths; 1- and 1½-in. thicknesses for ½- to 6-in. steel pipe or copper tubing. *Pittsburgh Corning Corp.*

MATERIALS LITERATURE

267—Urethane Guide. New research material, including calculations needed in urethane technology, has been compiled for this guide. Explains terms used in formulation of urethane foam, coating, etc. *National Aniline Div.*

268—Sealant. Booklet describes new techniques for retaining antifriction bearings. Gives case histories and other info. Sealant is a thin liquid plastic that hardens without shrinkage; easy to apply. *American Sealants Co.*

269—Laminated Panels. This 8-page booklet (2b, Ha) describes many applications for durable structural panels combining materials of various densities. Available with a number of weatherproof faces. *Haskelite Mfg. Co.*

270—"Tailor-Made" Alloys. This illustrated 14-pager lists properties, forms, and compositions of wrought copper and copper-base alloys. Covers tensile, yield, and shear strength; other technical data. *Olin Mathieson Chemical Corp.*

271—Pipe Insulation. Here's an 8-page catalog (No. 1-IN-477) that contains info on Fiberglas one-piece pipe insulation. Material can be used for hot and cold water and low-pressure steam lines. *Owens-Corning Fiberglas Corp.*

272—Adhesives, Coatings, Sealers. General characteristics, such as "short tack" and "long tack," and applications are discussed in Catalog Z-SIDE (12 pages). Includes explanations of design concepts. *Minnesota Mining & Mfg. Co.*

273—Tool Steel. Bulletin TS-100 has 12 pages of technical data on low-temperature, air-hardening tool and die steel. Illustrates applications, tells about machining, heat treatment; lists sizes. *Universal-Cyclops Steel Corp.*

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Self-contained model—with built-in speaker and control unit . . . mounts flat or upright.
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Separate speaker model, for rear or remote location of chassis, with speaker and microphone mounted in most convenient location.

You'll average almost

2 HOURS MORE PRODUCTIVITY

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That is what a survey of 45 typical companies showed. 2-way radio *increased* the productivity of each vehicle an average of 34%.

Motorola 2-way radio links *all* your materials handling vehicles—inside and out—with one central dispatcher. Radio helps him keep materials moving, enables him to get supplies *where* they're needed *when* they're needed.

And Motorola makes it easy to be "radio-controlled". From one source, you can get the complete "package"—systems engineering, financing, installation and maintenance.

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designed to fit every industrial vehicle

The smallest industrial mobile 2-way radio available . . . it uses transistors in power supply, receiver and transmitter to provide the lowest current drain of any industrial unit. It requires only one-eighth the drain of tube-type units, yet it has 50% greater speaker volume. Plated circuitry makes it more rugged and reliable. For use on gasoline, LP gas, diesel or electric powered vehicles. Get the full story today.

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Model FFE...1500 to 4000 lbs. capacity.

Transveyor low-lift platform and pallet trucks reduce aisle space and work easily in and out of trucks...are faster than the walkie type.
Model EPE (pallet type) 4000 to 6000 lbs. capacity.
Model ETWE (platform type) 4000 to 6000 lbs. capacity.

AUTOMATIC

has your answer in one of these maneuverable huskies

One of the fastest ways to increase operating profits is to get the most out of existing plant space. For your particular problem, this might require higher stacking, narrower aisles or an industrial truck to work in extremely congested areas. In any case, Automatic has the answer in one of the versatile trucks shown here.

Whatever your special materials handling problem may be, there's an Automatic Electric Industrial Truck engineered for your requirements. Over 200 standard models are available, and many can be equipped with special attachments. You can count on your Automatic representative, an experienced materials handling engineer, for any technical help you need to select the best possible truck for your job.

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☐ Rush complete information on Automatic's narrow-aisle truck. We are interested in Model _____

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FACTORY

S-T-R-E-T-C-H-E-D ?

Transveyor Stacker works easily in 6' aisles; stacks loads high; moves more tons per hour in a minimum of maneuvering space. **Model ESST**...2000 to 4000 lbs. capacity.

Triple-Action Transveyor for compact stacking in narrow aisles. Model ESRF lifts the load, extends it forward and swings it 30° right or left...2000 to 4000 lbs. capacity.

Transporter low-lift pallet and platform trucks work swiftly and efficiently where maneuvering space is at a premium. Available with wide or narrow battery compartments. **Model WP** (pallet type)...capacity, 4000 lbs. and up. **Model WW** (platform type)...capacity, 4000 lbs. and up.

Transporter Cantilever-Type Stacker with remote-control mast and special platform expedites selection of orders. This truck performs all the functions of a rider-type machine at considerably less initial cost. More maneuverable for working in cramped quarters. **Model WST**...capacities from 1000 to 4000 lbs.

For more facts Circle 554 on Reader Service Card

Keep areas super-clean . . .

protect workers . . .

boost public relations . . .

build team spirit

Four jobs (facing page) uniforms will do in your plant:

- **KEEP A CLEAN ROOM** really clean. Woman (top left) is nylon-garbed, will carry no dust or lint into the bearing shop.
- **PROTECT WORKERS' HEALTH.** The fire-resistant clothing of the man drying foundry sand (top right) keeps him cool and clean.
- **MAKE A GOOD IMPRESSION.** The uniform of the maintenance welder (lower left) looks good to plant visitors.
- **ADD TEAM SPIRIT TO THE JOB.** Even rescue workers (lower right) get a big lift from their uniforms as they drill for disaster.

These (and other) jobs are . . .

What Uniforms Will Do in a Plant

FIRST THING a disaster fighter at Esso Standard Oil Refinery (Linden, N. J.) does: He stops. Then pulls on white coveralls. Dons a white hat. Goes to work on the fire, starts rescue operations.

What does he gain in the 30 seconds it takes to pull on coveralls? He gains a little protection. But more important, he gains ready identification as a member of a working team. His psychology changes. He dons new responsibilities.

And what does this have to do with your shop? Plenty. In the same way new uniforms can transform a sandlot scrub team into a smooth ball club, work uniforms can put new enthusiasm, new spark into your workers' efforts.

WHY USE UNIFORMS?

Most workers like uniforms. Most workers want 'em. Managements who supply them to their plant workers do so—according to their own testimony—because uniforms bring greater cleanliness, health, and safety; increase efficiency of workers; eliminate delays in production; improve public relations; contribute to employee morale. All are money-saving considerations.

Your first decision must be your reason for wanting uniforms on your workers. One successful manufacturer has a plant visitation program. For him, uniforms are good public relations. He also believes that frequent changes to clean clothing eliminate contamination from dirt. And it's important to him that properly fitted but impersonal uniforms eliminate extremes in female clothing, which might distract fellow employees. Another manager feels work uniforms solve a social problem. Says he: "There's no problem created by one employee wearing more expensive clothes than another." Another manufacturer feels this way: "Clothing made to measure gives workers self-respect."

Uniforms are so called because they give uniformity of appearance to a group of workers. They're what this article is mostly about. Generally speaking, they fall into the same category as work clothing and safety clothing.

Work clothing may mean dungarees and jeans, or overalls, or work shirts and work pants of any type. An industrial engineer of a plant in heavy manufacturing describes work clothing as "any apparel suitable to work in, such as uniform, overalls, coveralls, or dress wear."

Safety clothing is defined in terms of specific hazards. It's a garment designed for some particular use, made of fabric treated to resist heat or acids. It may be designed without buttons or buckles or pockets. Some plants provide safety clothing for wear at certain jobs at all times. At others, such as Armco Steel Corporation (Middletown, Ohio), safety clothing is worn over regular clothing only during specific operations, such as tapping an open-hearth furnace or a blast furnace.

WHO USES UNIFORMS

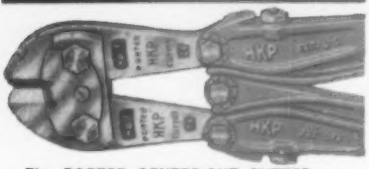
Manufacturers who stress quality control, and whose processing and packing operations demand special sanitary precautions, almost universally provide uniforms to their plant workers. Food packers are one good example of this group. Aside from such plants, practices vary with the operation and established custom of each company.

Countless variations occur in clothing requirements, payment methods, upkeep, and distribution. The variety occurs in divisions of one company and even among departments within one plant. For example, American Can Company's practice of supplying and maintaining workers' uniforms is general in only the seven or nine plants (of 65) where milk containers are produced. General Foods Corporation has no corporate policy regarding uniforms, each plant being autonomous.

Turn the page

By VIRGINIA MEREDITH
Personnel Consultant, New York City

THERE'S A



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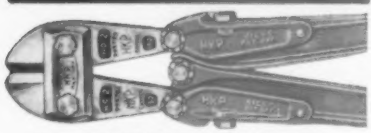

The PORTER HEAVY DUTY CUTTER — in 3 sizes, up to ¾" capacity. Specially designed for those rugged jobs in steel mills, construction companies and other heavy industries!

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Somerville 43, Mass.

WORKERS' UNIFORMS

Begins on page 190

A survey made in 1953 by Chemical Week (a McGraw-Hill publication) reported many different practices among chemical companies. Union contracts specified that safety clothing be provided in five of the many plants of Monsanto Chemical Company; general work clothes in one. Du Pont had a different set of practices in over 70 plants and 10 departments. But Du Pont tries to generalize with a basic policy that clothing (usually safety items) that is the property of the plant is supplied free to employees. The company pays half of whatever becomes the property of an employee.

Other managements pay for required garments, pay none or part of the cost of recommended or suggested clothing. As a general rule, clothing that is company property may not be worn home. This is usually the rule for uniforms that are rented, too.

According to a National Industrial Conference Board study, 39% of 515 companies questioned in 1954 required that uniforms be worn by some hourly workers. In some companies only guards and plant nurses were within this requirement.

How they're scheduled—The number of garments provided per year per worker depends on fabric wearability, place where garments are to be laundered, climate, and jobs for which clothes are to be worn. Three uniforms per year is a basic minimum. This allows one change per week. Four to eight uniforms are supplied to each employee by American Chicle Company. The company requires at least two changes per week. Dow Chemical Company issues protective garments at least every ten days or two weeks for workers who are exposed to acids.

Who wears them—Uniforms are worn by product and plant inspectors, laboratory workers, maintenance men, nurses and plant matrons, engineers, and employees in shipping and receiving rooms, toolcribs, and stockrooms. Girls are required to wear slacks when riding company bicycles or scooters. Uniforms are issued as a precaution against dermatitis, particularly for dirty work and for distasteful jobs such as tending incinerators. Labor contractors have

? Are your wash facilities for the white collar employees as good as those in the shop?

Bradley Washfountain, provide the maximum in sanitation and convenience. Cut shows stainless steel 54-in. circular model.

The Large ***Bradley Washfountains*** as shown above with foot-control are providing the most convenient and sanitary facilities in thousands of plants the country over.

Why not also provide ***Duo-Washfountains*** for

- ☆ Office Personnel
- ☆ Management
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- ☆ Cafeterias and Laboratories

There are no faucets to manipulate, being foot-controlled; there is never any unsanitary residue left in the *self-flushing* bowl—and they provide more economical washing facilities in less space. Stainless steel, and vitreous enamel in white and five attractive colors.

Each Duo serves two, cuts piping connections, and prevents water waste. Write today for complete data—Bulletin K-1204.

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Bulletin K-1204 mailed free on request

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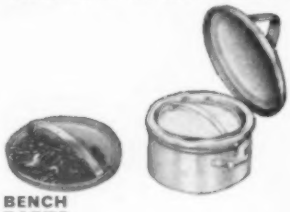
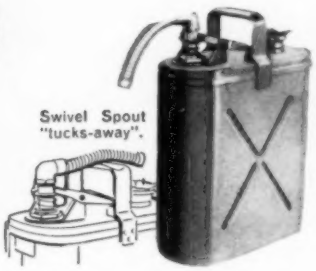


BENCH PARTS WASHER...

. . . with portable parts basket speeds cleaning small parts—keeps worker's hands out of solvent. Fire baffle-dasher stops fire, reduces vapors.

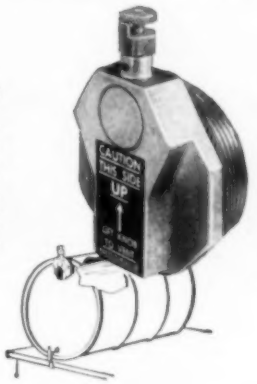
Coupon No. 25



SPACE-SAVING SAFETY CAN

Oval shape requires minimum storage space, permits natural, close-to-body carrying. Flexible spout safely speeds dispensing—no spillage. 5-gal. capacity.

Coupon No. 15



SAFETY DRUM VENT FOR END-BUNGS

Fire-explosion safe flame arrester vent designed to fit end-bung openings of drums stored horizontally. Stops leaks. Provides pressure-vacuum relief.

Coupon No. 16

NEW DEVELOPMENTS IN FLAMMABLE LIQUIDS SAFETY

New developments in the safe, productive use of hazardous liquids occur frequently. Often, these developments result from the needs of a single Protectoseal user—needs for which adequate safeguards did not previously exist. When these developments can be applied to operations in other plants, they are made available. The examples here are the most recent.

AUTOMATIC MASK WASHER

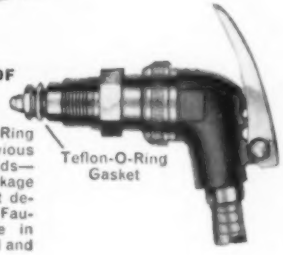
Safely, automatically washes paint-clogged spray masks in solvent. Uses any compressed air supply. Leaves worker free for production spraying. Fire-safe.

Coupon No. 26

LEAK-PROOF SAFETY FAUCET

New Teflon O-Ring gasket impervious to most liquids—prevents leakage due to gasket deterioration. Faucets available in stainless steel and brass.

Coupon No. 17



FLAMMABLES STORAGE CABINET

Approved now by N.F.P.A.; Board of Standards & Appeals, City of New York; Penna. State Police Bureau of Fire Protection—for storage of up to 45 gals.

Coupon No. 19

TILT-TYPE SAFETY CANS

Now available with space-saving wall bracket. Cans tilt easily to correct position for dispensing; swing back to upright position after use.

Coupon No. 22

Use coupon for complete information

VISCOUS LIQUIDS SAFETY CAN

For storing, dispensing liquids such as rubber cement. "Knife-like" closure blade over spout stops flow of liquid with clean "cutting" action—no sloppage.

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SAFETY DRUM PUMP

Designed for flammable liquids—now made equally efficient for light oils. No safety supervision problems—use a single pump for flammables as well as non-flammables.

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FOR MAXIMUM SAFETY ALL OVER YOUR PLANT

Important Safety Features

★ FIRE PROOF ★ SLIP PROOF
★ MAXIMUM STRENGTH
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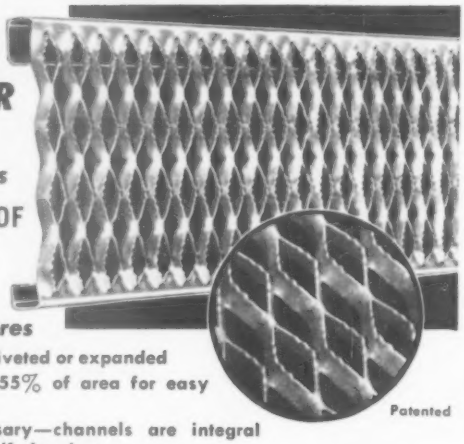

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★ All one piece, not welded, riveted or expanded
★ Open space in excess of 55% of area for easy access of light and air
★ No extra supports necessary—channels are integral part of the material. ★ Self cleaning
★ Cut and installed like lumber by your own maintenance force. ★ Low in original cost. ★ For balconies, no secondary sprinkler heads needed

Ideal for work platforms, stair and ladder steps, flooring, balconies, catwalks, machinery guards, fire escapes and for original equipment safety treads.

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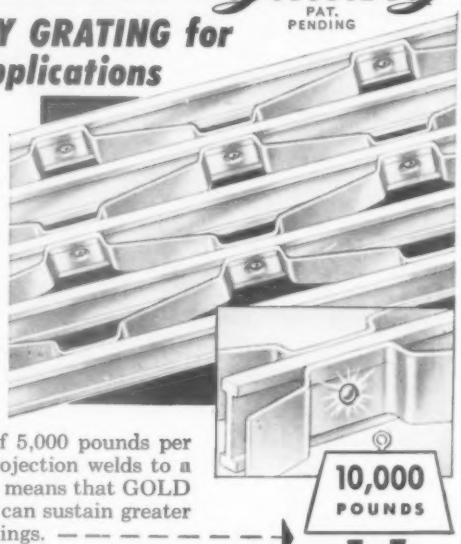
The QUALITY GRATING for Heavy Duty Applications

★ 3/8" projection weld nugget for greater rigidity and strength
★ Vertical alignment of the main load bar assured
★ All bars are load carrying bars including secondary bars
★ Anti-skid pattern



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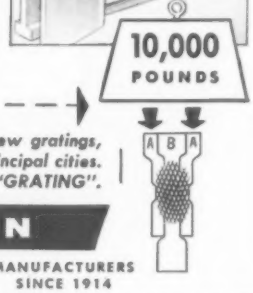
Each secondary load bar (A), as projected welded to the primary load bar (B) has a shear strength of 5,000 pounds per weld. There are 28 such projection welds to a square foot of grating. This means that GOLD NUGGET Welded Grating can sustain greater shock loads than other gratings.



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108

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The GLOBE Company MANUFACTURERS SINCE 1914
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said that management need not furnish apparel simply because work is "messy." But there are managements who consider it to be their responsibility to supply uniforms for just such jobs.

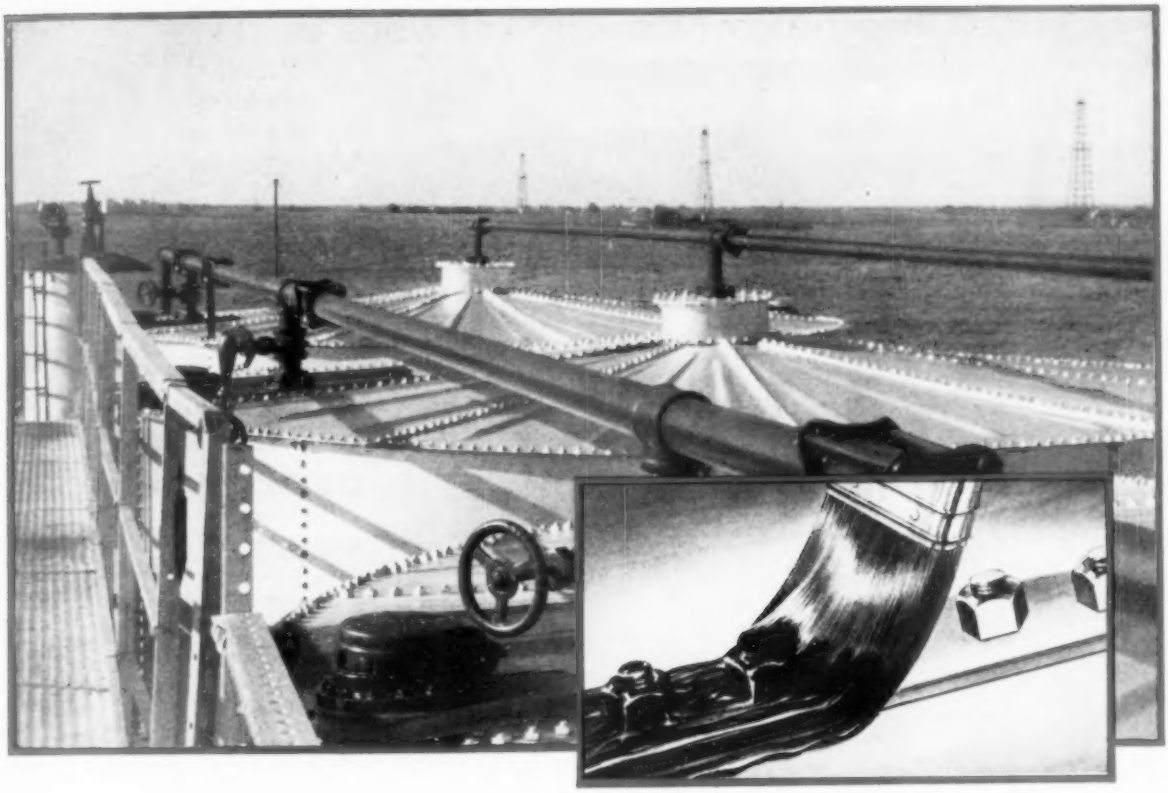
Some factories allow workers to decide whether to wear gloves at their work. Frequency of replacement of gloves depends upon their fabric and the use they are put to. Welders in one company are given up to one pair every two weeks. Materials handlers and painters get up to one pair a week. Since gloves have gone up in price, there's now a trend toward sending gloves to laundries, where they are washed and patched by heat method. This care lengthens glove life. Three patches are the wise limit.

Good fit, good looks—Pants and shirt with or without matching jacket (lined for winter wear) are the usual uniform for men. For females it's the dress-smock.

Workers now demand fit and fashion in their work clothes. There's a trend toward conservative, medium-gray clothing. But even flowered shirts brighten some factories. Older women may be satisfied with uniforms of indifferent fit but the younger ones hold out for the form-fit cut. Laundries that rent uniforms report a choice of 14 colors available in men's uniforms as compared with a choice of eight colors for the women. Here's a switch you wouldn't believe: Men like a change of color each year. But the women express far fewer preferences for periodic changes in color.

It's no longer a new idea to individualize by colors, but the colors are growing brighter. On a current building project for the Carrier Corporation in Syracuse, N.Y., Turner Construction Company, aiming at reduction in accidents, is testing vividly colored shirts on its workers. A color consultant has devised a construction color code: Blue shirts, signifying caution, for air-conditioning specialists and electrical workers. Green, associated with safety and first aid, for utility workers. White for men in semi-hazardous occupations, such as plasterers. Gray for foremen and stewards.

Turn the page



For leak-proof, trouble-free storage tanks...

SEAL WITH THIOKOL POLYSULFIDE RUBBER SEALANTS

Bolted tank construction – steel or aluminum – sealed with THIOKOL polysulfide type sealants is providing the happy solution to more and more storage tank problems in the petroleum field.

These superior sealants come in liquid form, apply easily and cure rapidly to a tough adhesive rubber. They stand guard against leakage of oil and its by-products . . . stand up to gasoline, moisture, temperature extremes and other deleterious elements. They do not contaminate stored fuels.

One application of THIOKOL polysulfide type sealants to bolts, seams, and joints produces a positive, durable seal that can last as long as the tank itself.

It prevents rust and corrosion at critical joint areas, too––and in the case of portable installations, makes tank dismantling and re-assembling far easier. Overall maintenance costs come down . . . time and labor savings move up.

Because THIOKOL *polysulfide rubber shows outstanding resistance to most aliphatic and aromatic solvents, and is relatively unaffected by aging, weathering, sunlight and ozone, it is meeting many critical needs in the petroleum industry. For the full story of how* THIOKOL *polysulfide rubber serves you better, mail the coupon.*

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Gentlemen: Please send me further details about THIOKOL *polysulfide rubber sealants in the petroleum industry.*

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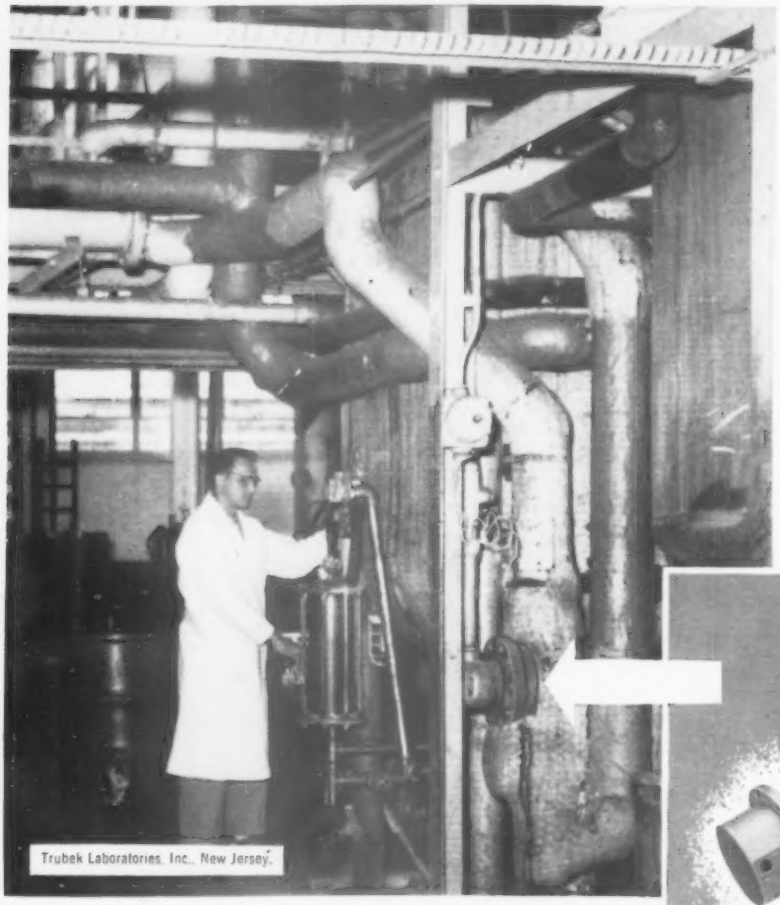
Call your Chromalox Man for answers to . . .



When temperature requirements could no longer be met by a hot tempering oil central system, Chromalox "job-side" heating provided the answer.

Widely different temperature requirements on various processing vessels

Recently, this New Jersey company converted an old hot-oil central system to Chromalox electric "job-side" heating. In addition to being troublesome, the old system could not provide the variety of temperatures required for their growing diversity of products. Switching to Chromalox Immersion Heaters, they now use Aroclors and Dowtherm as heat transfer media. On one 350-gallon vacuum still, 18kw of heat capacity now provides temperatures of 290°C. Chromalox Type TMO Immersion Heaters operate in the bottom of the vented vessel jacket which contains the heat transfer medium. Using 30kw, a 450-gallon sealed jacket reactor can attain temperatures to 325°C, using Dowtherm-A.

Since some vessels had previously been equipped with steam coils or were glass-lined, insertion of heaters into the vessel or jacket was impractical. Instead, transfer media is heated adjacent to the vessel and circulated by sump-type centrifugal pump.

Perhaps your Chromalox Man, listed at the right, can help you solve some of *your* heating problems the easy, economical, *electrical* way. Why not give him a call for

Faster heating of water, oils, Dowtherm, Prestone.
Faster melting of grease, asphalt, solder, babbitt.
Faster superheating of steam, compressed air.

4994

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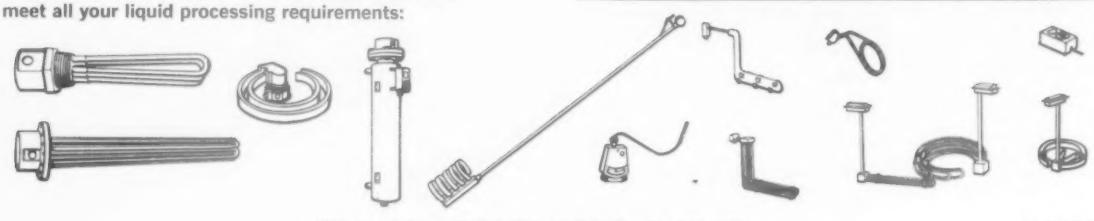
CHROMALOX has a complete line of electric heaters to meet all your liquid processing requirements:



Call Chromalox for the man with the **Electrical Answers** to your heating problems

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Mohawk 4-6113
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BALTIMORE 18, MD.
Paul V. Renoff Company
333 East 25th St.
Hopkins 7-3280

BINGHAMTON, N. Y.
R. P. Smith Co., Inc.
94 Henry St.
Phone 4-7703

BLOOMFIELD, N. J.
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Amherst 5-3862

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WORKERS' UNIFORMS
Begins on page 190

HOW WORKERS FEEL

If you fear that giving uniforms to a handful of workers will create demand from other workers for equal benefits, you're right. Arbitration cases involving work clothing are infrequent. Usually they are demands from an additional group of workers for company-supplied clothing. In most cases decisions have been in favor of management, based on precise wording in the labor contract and also on company practice over a period of years.

The AFL-CIO estimates that a work-clothing clause occurs in only about 20% of negotiated contracts —which cover a wide range of industries. A Bureau of National Affairs analysis of 400 contracts negotiated in 1956 found that work clothing was a contract item in 12% of manufacturing industries as compared to 36% of non-manufacturing.

The AFL-CIO feels that present figures do not give a complete or accurate picture of industry practices regarding work clothing. That's because these practices are so seldom written into contracts. Manufacturers give considerably more assistance to employees by way of clothing and its upkeep than they are required to do by union agreements, labor laws, sanitary codes, or other regulations.

Hazards in contract language— When a work-clothing clause is included in a union contract, the term and the jobs on which the clothing is to be worn must be specified and agreed upon exactly. The wisdom of this is pointed up in arbitration cases.

Union Carbide and Carbon National Laboratory (Oak Ridge), for example, lost an arbitration decision in 1951 because work clothing was not clearly defined in the contract. The arbitrator noted that "the fact that the clothing was included in the labor agreement indicated that both parties had a mutual interest in it." He also commended the company's "moral efforts to protect health and safety of its employees" as "most praiseworthy." But the lack of precise definition in the negotiated agreement rendered a decision unfavorable to the company.

Since many plants require uniforms to prevent workers from get-

NEW... from SEALMASTER

The "LP" Pillow Block

- **Precision self-aligning one-piece unit. No extra assembly costs for you.**
- **Malleable housing provides maximum strength with light weight.**
- **Permanently sealed—pre-lubricated with high grade lubricant.**
- **Nothing of comparable value in low price field.**

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A DIVISION OF
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How Much Service Does Your Maintenance Dollar *REALLY BUY?*

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A *modern* approach to apparatus maintenance that can help lower your costs, reduce downtime, achieve more economical production line operation. A-c motor repair in 12 hours, in-plant maintenance consultations, high quality materials, experienced workmanship . . . you get all this, and many other benefits *at no additional cost.* Clip the coupon below and send it in today for more information on what General Electric's Service Shops can do for you.

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GENERAL ELECTRIC

WORKERS' UNIFORMS

Begins on page 190

ting hurt, uniforms also fall into the drier, and a set of three presses (one category of safety clothing. One woman who was fired last year—because she refused to wear slacks at her job—carried her grievance to arbitration. She won. Why? Because it was established that her foreman had not stressed safety as the basic reason for her wearing slacks.

MAINTAINING UNIFORMS

Few plants run their own laundries. The expense is too heavy. And many that now have laundries are studying a changeover. It costs $10,000 to $12,000 to install a laundry with one washer, an extractor, a each for shirts, pants, and coveralls). This equipment will launder about 100 pounds per hour (about 75 shirts and pants). Costs for space, power, depreciation, wages, checking and distribution, space for inventory, and other supply and maintenance costs can add up to more than the cost of services from an industrial laundry.

Chemical plants, powder plants, and atomic energy plants have held on to their own laundry facilities. But industrial launderers now can adjust their services to meet even these needs. Laundries servicing atomic plants, for example, run Geiger counters over clothing and wash only those clothes that have a fairly safe amount of contamination. They destroy heavily contaminated garments immediately. Such laundries set aside special trucks and give special handling to the "hot" clothes.

RENTAL—THE EASY ANSWER

One easy way out is the uniform rental plan offered by industrial launderers. As a ball-park estimate, uniforms rent for about 80¢ per man per week, at one change per week. Two changes per week cost about $1.50 in the New York area. Uniforms are cleaned, kept in top repair by the laundry that supplies them. Each new garment is measured to fit its wearer. New garments replace old ones with definite frequency, about every eight months, whether the old ones are worn out or not.

Turn the page

CM Lodestar® electric hoist

now... important new models

LARGER CAPACITY

FASTER SPEEDS

GREATER SELECTION... from a complete range of capacities and speeds ...1/8 to 2 tons and 8 to 60 fpm.

Here's your opportunity to slash lifting and handling costs. Put these new Lodestars to work where their increased speeds and capacity match your maximum requirements.

LODESTAR FEATURES INCLUDE:

- Safe, Heavy Duty Performance
- Lowest Headroom
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- Ultra-Modern Electric Braking
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Request catalog and name of local stocking distributor.

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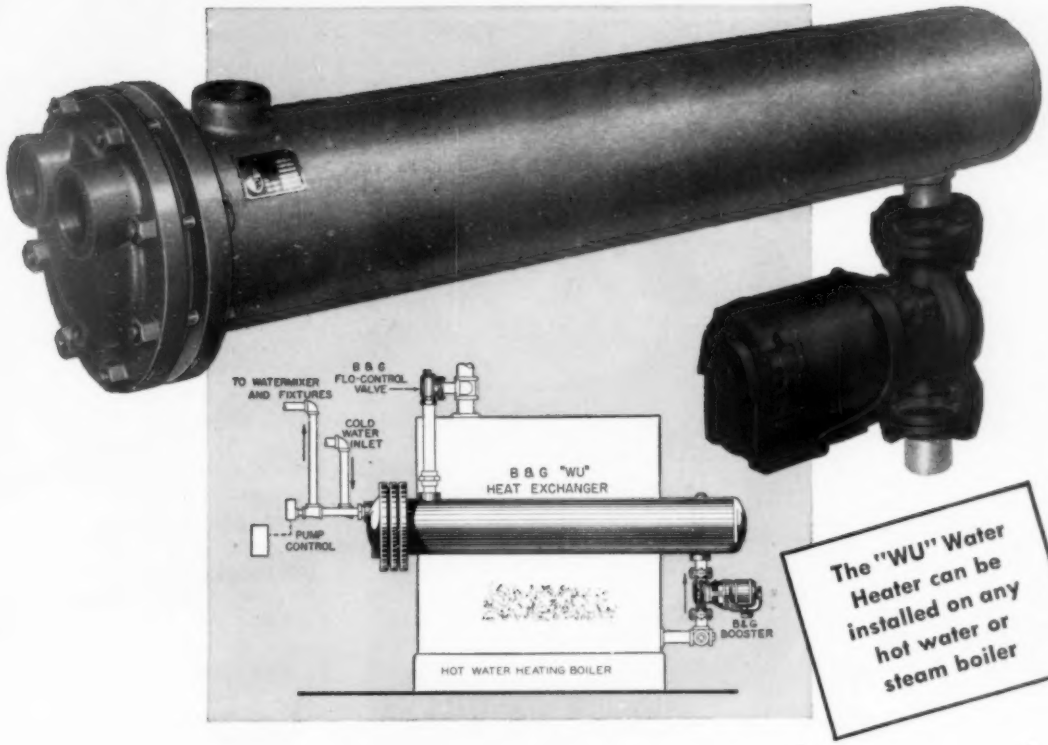
CM HOISTS



The "WU" Water Heater can be installed on any hot water or steam boiler

HOW TO CUT WATER HEATING COST WITH A B&G TYPE "WU" INSTANTANEOUS HEATER

There are three reasons why a "WU" Heater will produce large volumes of hot water with maximum economy—

1. It ends the need for bulky, space-wasting storage tanks...because it is an instantaneous heater, heating water as rapidly as needed.
2. It eliminates an expensive, separately fired water heater...because it heats service water with hot water from the heating boiler, *winter and summer.*
3. It lengthens boiler life...because it requires summer operation of the boiler, preventing the rapid deterioration which occurs when a boiler is idle.

Pumped circulation steps-up capacity

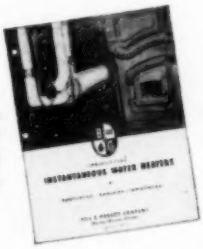
The "WU" Heater is equipped with a B&G Booster Pump which pumps boiler water through the heater shell, thereby greatly increasing the capacity of the Heater. An unbelievably small unit produces large volumes of hot water. Service water temperature is closely controlled...the Booster starts whenever the water goes below the desired degree and continues to run until service water is again at the proper temperature.

B&G ALL-BRONZE BOOSTERS

For long life in circulating hot or cold raw service water

The corrosive effects of continuously pumping fresh water materially shortens pump life unless a bronze unit is used. The B&G All-Bronze Booster is specifically built for such applications. Now painted bronze for easy identification.

Send for free booklet on application, selection and installation of B&G Instantaneous Water Heaters.



BELL & GOSSETT COMPANY

Dept. FQ-13, Morton Grove, Illinois

Reg. U.S. Pat. Off. Canadian Licensee: S. A. Armstrong Ltd., 1400 O'Connor Drive, Toronto 16, Ont.

SURVEY REVEALS INDUSTRY'S NO. 2 SKIN HYGIENE PROBLEM: TOUGH SOIL REMOVAL

Here's help on the problem from SBS

A recent survey of 2,177 major plants pinpoints industry's most serious skin hygiene problems.

1. *SKIN DISEASE and*
2. *REMOVAL OF TOUGH SOILS*

Naturally, the second contributes to the first. Because tough soils invariably lead to the use of harsh cleaners and solvents when proper cleaners aren't handy. Heavy greases, resins, tars, and similar soils resist ordinary skin cleaners, and when the worker finds he can't remove them, he resorts to solvents or other materials that injure his skin. Result: skin disease, poor employee relations, cost and waste.

What can you do? Ask an SBS representative to show you "Operation Pinpoint", 10 minute sound slide digest of the national survey, and you'll see how *a planned corrective program* can solve these skin hygiene problems. Because SBS produces a *complete range of cleansers,* he can suggest the right cleanser for each job. For the safest answer to tough soils, write today . . . Dept. 1-E.

the washword of industry

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CANADA: Chemical By-Products, Ltd., Toronto, Ontario

WORKERS' UNIFORMS

Begins on page 190

Each garment is marked with the wearer's name and may carry the company name and emblem.

When employees pay—Individual employees can subscribe to a rental laundry service. Management may arrange for the paperwork to be done in its personnel office. Employee payments for the service are made either through payroll deduction or through the laundry deliveryman at workers' benches during shifts. Or you can use Change-O-Matic laundry lockers. These have a coinbox built into each compartment, providing the ideal means of payment. The lockers are part of the rental arrangement provided 10 or more workers in a plant are involved. No industrial laundry refuses an account even if only one worker in a plant uses the service once a week. That one customer is an effective foot in the door and laundries say it always results in more customers.

The delivery problem—Management's remaining problem with laundry service has been deliveries. But laundry lockers have solved this problem. They're designed for the exchange of garments—not for their storage—and are sized to hold up to three or five uniforms per compartment. The factory employee knows he will be supplied with clean shirts that are his alone, measured to fit him. Only he and the laundry deliveryman handle them, so errors and confusion are at a minimum. Workers spend less time away from work when they're making the change into clean clothing.

WHAT THE COSTS ARE

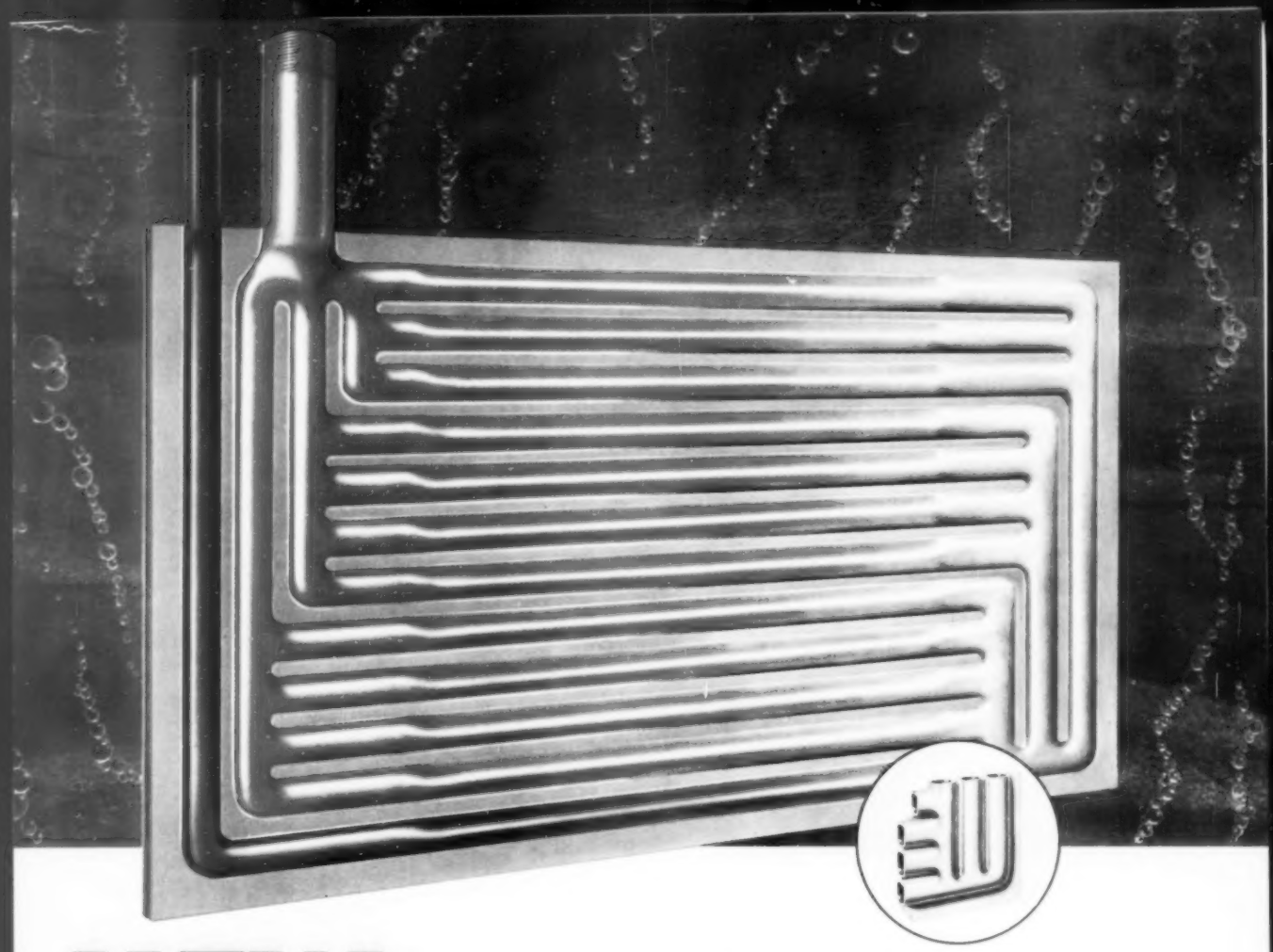
Initial costs of clothing to management vary according to fabric, cut, color, and other factors. The prices given below are the approximate purchase costs for items of satisfactory quality (estimated by Consolidated Laundries Corporation, New York City):

Man's uniform (pants and shirt) of khaki twill	$6.25
Work pants (separately)	3.50
Shirts:	
Short-sleeved white	2.00
Long-sleeved colored	2.75

Turn to page 204

For more facts Circle 565 on Reader Service Card

For more facts Circle 566 on Reader Service Card ➤



NEW MULTI-ZONE PLATECOIL®

An exclusive Tranter advancement in heat transfer technology

IMPROVED PLATECOIL® design cuts "downtime", compensates for intermittent overload

The new MULTI-ZONE PLATECOIL provides a reserve of heating and cooling capacity for faster heat transfer when it is needed. This "stand-by" capacity is available to meet the demands during "start-up" of processing tanks after week-end shut downs. It also supplies the recovery ability needed to keep tanks at a desired temperature as new "work" or processing ingredients are introduced.

MULTI-ZONE coil configuration, a TRANTER exclusive, distributes steam uniformly to all levels of the plate to produce "total effective area" heat transfer. FREE-FLO ACTION, without efficiency-robbing condensate trapping has been accomplished through the use of multiple headers.

In addition to this bonus capacity, the new MULTI-ZONE PLATECOIL presents new construction features which expand application possibilities.

Operating pressures up to 250 psi, with a safety factor of over 5 to 1, enable you to apply the cost-cutting advantages of PLATECOIL to a wider than ever range of heating and cooling problems. Higher pressure containment has been accomplished through the use of TRANSTEEL, mill-controlled mild steel in standard PLATECOIL, plus DURAWELD bonding of plates. TRANSTEEL also holds corrosion to a minimum.

NOW FASTER START-UP... CONSTANT TEMPERATURES

Factory-fabricated units cut engineering, installation and maintenance costs

The new MULTI-ZONE PLATECOIL offers the time-proven advantages of PLATECOIL over pipe coils. Higher efficiency saves tank space. Standardized "package" units can be engineered quickly and accurately with readily available performance data. You completely eliminate the cost of cutting and assembling pipe coils. Installation costs are low because PLATECOIL units are lightweight and easy to handle. Pre-engineered, ready-made hangers are designed for fast installation and removal of plates for cleaning. Cleaning is easy due to the streamlined PLATECOIL design, which also tends to retard the build-up of deposits on coil surfaces. Electric-welded and pressure tested, PLATECOIL units have no threaded joints to corrode or leak. Simple connections can be located above the liquid level, free from contamination.

Put this new PLATECOIL to work for you to cut costs on all types of heating and cooling applications.

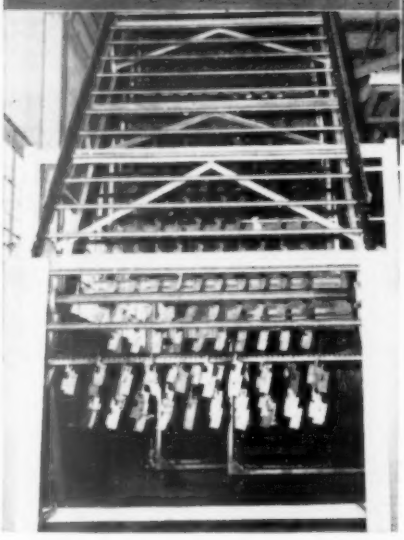
Send for NEW PLATECOIL Bulletin No. P60 for complete specifications and performance data.

Tranter Manufacturing Inc.

LANSING 9, MICHIGAN

PLATECOIL® DIVISION

FINISHING SYSTEMS...



The 8 Ft. wide Crossbar Conveyor carries a variety of products and a great mass of small parts through all processing units of the Dip Coating System. The Crossbars in the Conveyor are designed for a work load of 250 lbs.

Complete Mahon Installation Provides Compact Facilities for DIP COATING and SPRAY PAINTING in CUTLER-HAMMER'S Lincoln, Illinois Plant!

In this unique finishing system, the greater part of which is located on the roof, Mahon engineers have employed what is probably the longest continuous crossbar conveyor ever designed into equipment of this type.

The painting enclosure shown above is inside the large electrical plant. This enclosure is divided into two sections, one of which has a paint mixing room on the ground floor and paint Dip Tanks on a mezzanine floor above. The other section houses two Spray Booths and a Batch-Type Finish Baking Oven. The conveyorized, Five-Stage Metal Cleaning and Rust Proofing Machine, Dry-Off Oven, Finish Baking Oven and the Filtered Air Supply Equipment are housed in one enclosure on the roof.

This is the third complete finishing system installed by Mahon in Cutler-Hammer Plants across the country.

If you have a finishing problem, or are contemplating new finishing equipment, you, too, will want to discuss methods, equipment requirements and possible production layouts with Mahon engineers . . . you'll find them better qualified to advise you, and better qualified to do the initial planning and engineering which is so important in specially designed equipment of this type.

See Sweet's Plant Engineering File for Information, or Write for Catalogue A-659

THE R. C. MAHON COMPANY • Detroit 34, Michigan

SALES-ENGINEERING OFFICES in DETROIT, NEW YORK and CHICAGO

. . . the EXPERIENCE that goes into the PLANNING and ENGINEERING of MAHON EQUIPMENT is the item of GREATEST VALUE to YOU!

MAHON

Now! FULL-POWER Fire Fighting with this complete dry chemical line!

Kidde top-rated portables and wheeled units kill more fire... faster!

From the powerful new 2½-pound portable, on up to the giant 200-pound wheeled unit, Kidde dry chemical extinguishers pack the *extra* punch needed for stubborn blazes, for *full-power* fire fighting. Available in pressurized 2½, 5, 10, 20 and 30-pound capacities, Kidde dry chemical portables feature simple, one-two operation, are easiest of all portables to operate, even while wearing gloves. Kidde portables have no valves to turn, no pins to pull, need no bumping or inverting. Just aim, pull trigger, and fire's out! All are quickly and easily pressurized, have dust- and moisture-proof gauges which show at a glance when unit is charged.

The 200-pound Kidde pressurized wheeled unit discharges a 40-foot dry chemical stream faster, has an *extra* 50 pounds of fire-smothering dry chemical to knock down fire quicker. It's faster and easier to operate . . . just remove pin, swing toggle lever, and flip on-off lever. Easy to maneuver because of its low center of gravity and larger wheels. Truly a one-man fire engine!

All Kidde extinguishers are granted top rating by Underwriters' Laboratories, are the finest extinguishers on the market today. Get more information about this *complete* line of *full-power* fire fighting equipment. Write to Kidde today!

Kidde (K Kidde)

Walter Kidde & Company, Inc.
332 Main St., Belleville 9, N. J.
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Montreal—Toronto—Vancouver

WORKERS' UNIFORMS
Begins on page 190

Jackets:	
Winter—denim with shrink-resistant lining	$6.75
Summer—poplin, unlined	4.00
Coveralls of green covert	6.25
Bib overalls (used by farmers and railroad men	3.75
Laboratory coat, plain white	4.50
For women:	
Blue denim jeans of good quality	2.75
Jeans of twill	3.50
Cotton dress or smock	3.75

Lint-proof uniforms are made of synthetic-fiber fabrics and are at least double or triple the cost of cotton uniforms.

Items must have launderability—with features (such as buttons instead of zippers) that reduce cost and are safer in laundry machines.

Share-the-cost plans—Some plants share costs with workers. There are seven ways of doing this:

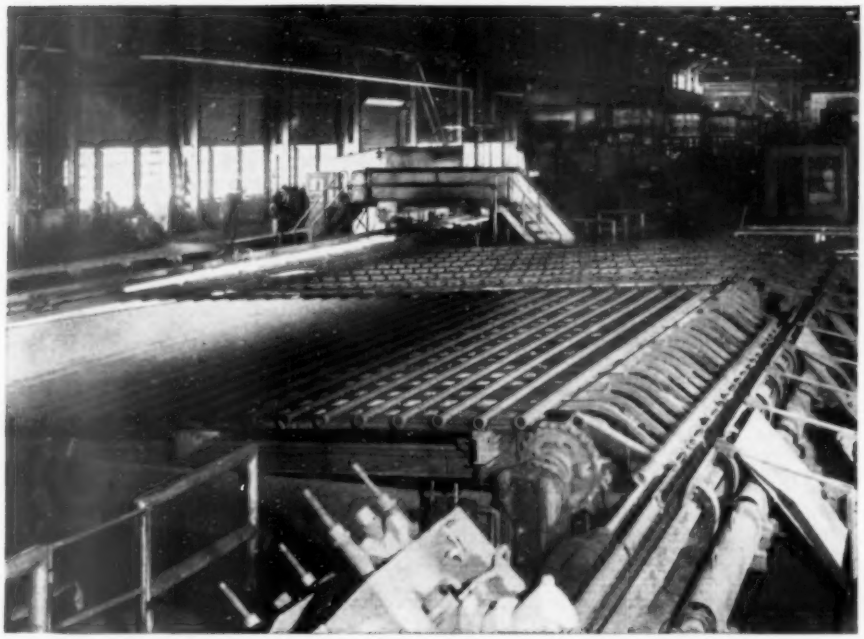
1. Pay a per cent of total cost.
2. Work out deals with clothing manufacturers or retailers to get discounts for employees.
3. Sell clothing to employees at nominal cost through their own plant store. A union contract of International Harvester Company stipulates that its female employees, when buying clothing in company stores, should be charged no more than a wholesale price plus 5% handling charge plus taxes.
4. Allow a certain amount, perhaps 50¢ per week, as a contribution toward employee's clothing costs.
5. Provide half of the employee's clothing, require the employee to furnish the other half.
6. Supply the full basic set free (perhaps three uniforms and three sets of underwear) and pay one-half the cost of replacements.
7. Pay for replacements only.

A National Industrial Conference board study turned up 210 companies that supply work clothing for at least a few of their employees. Of these companies . . .

- 77.6% pay full cost of clothing.
- 10.4% share the cost with their employees.
- 7.5% pay no part of the cost.
- 56.7% pay full laundering cost.
- 2.5% share laundering cost with employees.
- 29.4% don't pay for laundering.

For more facts Circle 568 on Reader Service Card

Many industrial operations need the extra qualities of Promal chain



LINK-BELT H CLASS PINTLE CHAIN with pusher attachments on this pipe cooling rack designed by Aetna-Standard Engineering Co. receives white-hot pipe from finishing operations in a continuous butt weld mill. Controlled chain speed permits uniform cooling of outer tube periphery.

Specially heat-treated malleable iron resists heavy and abrasive loads

Fewer conveyor shutdowns and minimized replacements are economies realized by users of Link-Belt Promal chain. Promal will withstand repeated cyclic heating up to 1000° F. Its greater strength absorbs continuous impact loads, and high wear resistance supplies the durability to cope with severe abrasion.

A Link-Belt Development

Promal is more than a partially annealed or surface-hardened malleable iron. Developed by Link-Belt, this specially heat-treated malleable iron is actually transformed into a metal of radically different physical properties. Promal, because of uniform microstructure throughout its whole section, provides greater ultimate strength, higher yield point, exceptional fatigue resistance.

Where and how to apply Promal

Choose Link-Belt Promal chains for highly abrasive or heat-conditions—for extra strength and wear resistance demanded by heavy loads or long sliding conveyors. They last much longer . . . cost but a little more.

The wide range of Link-Belt chains available in Promal includes all types of cast and combination chains.

SMGL-618 PROMAL chain conveyor is another example of the applicability of heat-resistant Promal. This chain conveyor with special joint design and riser attachments picks up and conveys sheet steel through furnace. Chain has operated continuously for two years without failure. The heat-resistant properties of Promal also make it a desirable material for use on low-temperature heat-treating equipment.

PHYSICAL PROPERTIES OF PROMAL

Compare this with other ferrous materials used for chain applications.

Yield Point	55,000 pounds per sq. in.
Ultimate Strength	75,000 pounds per sq. in.
Fatigue Strength	35,000 pounds per sq. in.
Elongation	10 to 14% in 2 inches
Average Brinell Hardness	170 to 190

PROMAL'S high strength factors make it ideal for especially long elevators and conveyors.

HEADQUARTERS for Link-Belt products is your nearby Link-Belt office or authorized stock-carrying distributor. Refer to the yellow pages of your local phone directory.

LINK-BELT

CHAINS AND SPROCKETS

LINK-BELT COMPANY: Executive Offices, Prudential Plaza, Chicago 1. To Serve Industry There Are Link-Belt Plants, Sales Offices, Stock Carrying Factory Branch Stores and Distributors in All Principal Cities. Export Office: New York 7; Canada, Scarboro (Toronto 13); Australia, Marrickville, N.S.W.; South Africa, Springs. Representatives Throughout the World. 14,023-A

For more facts Circle 569 on Reader Service Card

FACTORY CATALOG NEWS

For more about these items, circle numbers on Reader Service Card next to back cover.

MATERIALS HANDLING

1—Bins, Tanks, Tilts. This 20-page catalog (No. 7) describes Tote system of handling bulk material. Shows equipment for automatic filling and discharge stations, various plant operations, and special applications. *Tote System, Inc.*

2—Power Drive for Lift Trucks. Catalog No. SP-24 (12 pages) explains new method of instant power application for fork lift trucks. Based on principle of hydrostatics, power drive is said to lessen driver fatigue. *Towmotor Corp.*

3—Chain Sling Links. Illustrated 4-pager (CL-1) tells about advantages of an "improved" alloy link for making on-the-spot chain slings and assemblies. Includes guide for selection of component parts, handy load chart. *The McKay Co.*

4—Truck Batteries. Storage batteries that boost work capacity of electric trucks are described in 8-page bulletin (No. 6230). Batteries can be used interchangeably in more than one size truck. *The Electric Storage Battery Co.*

5—Portable Elevators. Here's a reference guide (20 pages) that illustrates advantages and applications of various types for vertical material handling. Outlines special features, etc. *Assn. of Lift Truck & Portable Elevator Mfrs.*

6—Jib Cranes. This 4-pager describes installation of four models of maker's wall-bracket full-cantilever-type cranes. Designed for maximum hoist travel where there's a minimum of overhead room. Capacities to 3 tons; spans to 20 ft. *All-State Engineering Co., Inc.*

7—Roller Gravity Conveyors. How to solve unit load handling problems with these conveyors is explained in a 52-page illustrated handbook. Includes applications, accessories, easy-to-read curve charts, and specs. *Lamson Corp.*

8—High-Lift Stackers. Specs and operating features of four battery-powered hand trucks are covered in 6-page Catalog No. SS953. Stackers have capacities of 1500, 2000, 2500, and 3000 lb. Photos, drawings. *Clark Equipment Co.*

9—Cranes. "Keep Your Capital Investment Down" is a 6-page bulletin (No. 91) that tells about company's line of Thrif-T cranes. Features new geared-type timing belt, life-lubricated bearings. Application photos. *Whiting Corp.*

10—Casters and Wheels. Catalog No. 130 (16 pages) lists over 500 sizes or variations of wheels in semi-steel, molded rubber, molded plastic. Optional accessories include swivel locks and bearing seals. *The Hamilton Caster & Mfg. Co.*

11—Electric Chain Hoists. Here's a 12-page bulletin (158-G) that describes company's complete line of hoists and accessories. Capacities from ⅛ to 2 tons, lifting speeds 8 to 60 fpm. Specs, photos. *Chisholm-Moore Hoist Div.*

VALVES AND PIPES

12—Solenoid Valves. High-pressure d-c and a-c pilot-operated valves for control of hydraulic systems are described in Catalog No. 2000 (12 pages). Includes photos, drawings, charts, other technical data. *Waterman Engineerng Co.*

13—Finger-Flexible Hose. Bulletin No. 400 (6 pages) discusses construction and improved means of assembly for metal and Teflon hose. Info on Quick-Seal couplings and electrical connectors. Has specs, charts, photos. *Titeflex, Inc.*

14—Plastic Pipe. Here's a 6-pager (No. HT-100) with info on rigid pipe used for natural gas lines, deep-well and chemical piping, electrical conduit. Applications, tables and charts of working pressures. *Carlon Products Corp.*

15—Hose Assemblies. Catalog No. 4501 (4 pages) tells about various types of hose with permanently attached ends. Some have special liner materials. Threaded end fittings include male pipe, swivel nut, others. *Parker-Hannifin Corp.*

16—Control Valves. This 8-page catalog illustrates and describes air and hydraulic valves. These include manual, mechanical, and pilot-actuated types in NPT sizes ⅛- to 1-in. Has photos and data tables. *Beckett-Harcum Co.*

MAINTENANCE

17—Mechanical Seals. This 4-page catalog (P.O.50674) discusses seals that are said to stop leakage of gas and liquids from around rotating shafts of pumps, compressors, mixers, etc. *Syntron Co.*

18—Boiler Cleaning. Problems of heat transfer loss occurring in soot-covered boiler tubes are solved in illustrated 4-pager (Form 951). Describes method that's said to cut cleaning time, reduce heating costs. *Breuer Electric Mfg. Co.*

19—Lubrication Systems. Catalog No. 81 (32 pages) presents lubricant application equipment, fittings, and accessories. Describes completely automatic centralized systems, semi-automatic and manual methods. *Lincoln Engineering Co.*

20—Backhoe-Loader. Here's an 8-page bulletin (CUS-110) that describes 35 operating advantages of the "matched" trenching-loading machine. Includes mechanical details of this heavy-duty tractor; action views. *J. I. Case Co.*

21—Dialysis System. Bulletin WC-121 (6 pages) is said to be the first one issued that gives facts about this system for treating acid liquors. Can also be used for recovery of caustic and neutral salt. *Graver Water Conditioning Co.*

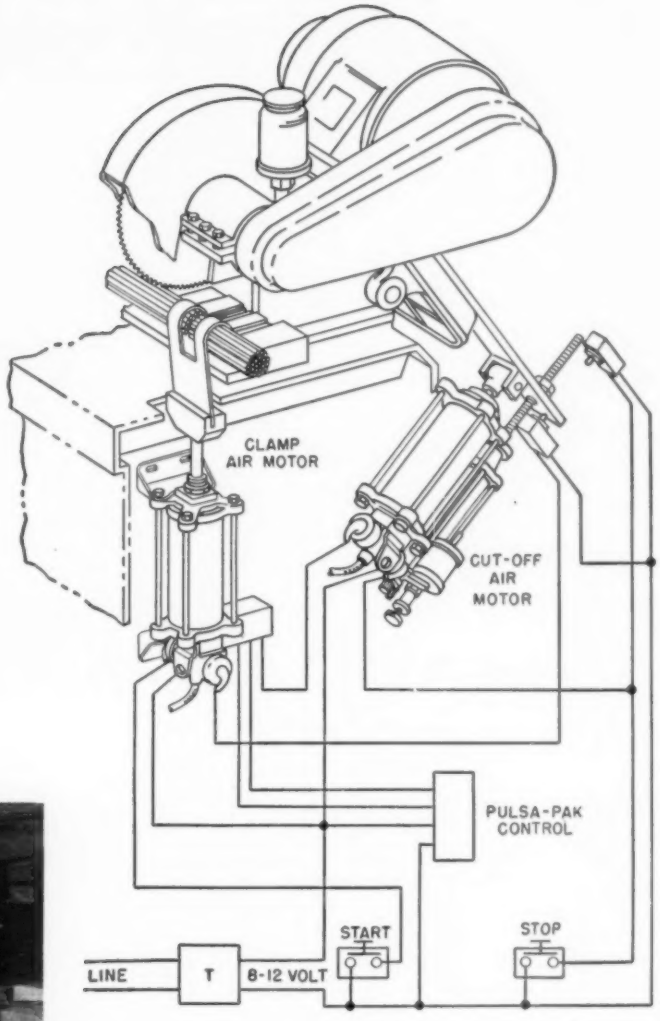
Turn the page

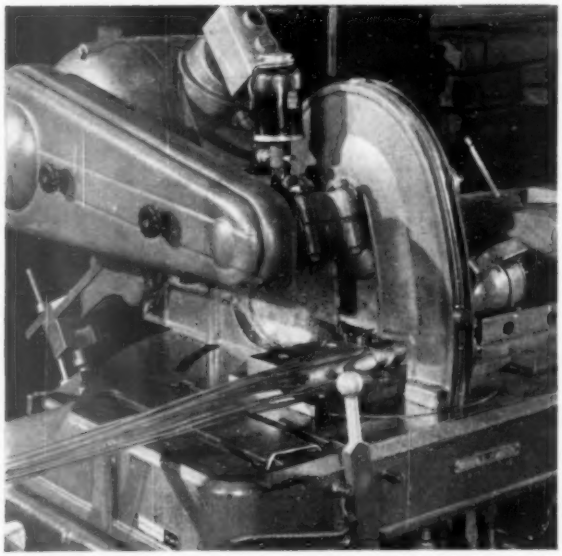
HOW TO MAKE A CUT-OFF SAW PRODUCE MORE AT LESS COST

Shown at the right is a SPOT-A-MATION IDEA used in many plants. Almost invariably it has meant cost savings of 50% or more—has improved product quality, lengthened saw life, lessened worker fatigue.

Two Bellows Air Motors are used. One, hydraulically controlled, feeds the saw through the work. The second clamps the work in position. The two Air Motors are electrically interlocked. The cut-off saw can be made completely automatic by adding a third Air Motor to feed the material.

This is another typical way Bellows Air Motors are used to "Spot Modernize" existing equipment. Almost any hand-fed, or hand-controlled machine can be made to produce more, at less cost, with versatile Bellows "Controlled-Air-Power" Devices.





Typical application of this SPOT-A-MATION IDEA in the plant of Milwaukee Gas Specialties where gas tubing is cut to length. Here costs were cut better than 50% and cost of rejected material reduced 20%.

THIS SPOT-A-MATION IDEA FILE IS YOURS ON REQUEST

Contains drawings, circuit diagrams, equipment list, and full details to enable you to convert existing equipment to lower cost operation. Write for it today. No obligation.

Address Dept. FA359 The Bellows Co., Akron 9, Ohio.

The Bellows Co.

DIVISION OF INTERNATIONAL BASIC ECONOMY CORPORATION (IBEC)

AKRON 9, OHIO

1284-B

OTHER INDUSTRIAL DIVISIONS OF IBEC: Sinclair-Collins Valve Co., Valvair, Akron, Ohio • V. D. Anderson Co., Cleveland, Ohio

22—Incinerators. Pocket-size brochure MM-BRP has 12 pages on packaged-type refractory lined incinerators. Covers new models added to maker's line to handle waste disposal. *Brulé Incinerator Corp.*

23—Mountings. Compression- and shear-type center bonded mountings are discussed in 4-pager (No. 712). Deflection curves, dimensions, installation diagrams, performance data, specs. *Lord Mfg. Co.*

PLANT SITES

24—Mississippi. "America's No. 1 State of Industrial Opportunity" is a 32-page brochure. Photos, maps, statistics show living and working advantages. *Mississippi Agricultural & Industrial Board.*

25—Dallas/Fort Worth. The Great Southwest Distribution Center, located in center of the Dallas/Fort Worth metropolitan area, is described in 8-pager as an important productive region. *Great Southwest Distribution Center.*

26—New York State. Small 16-pager, "Research and Technical Assistance for the Smaller Industries of New York State," describes facilities offered by educational institutions. *Associated Industries of New York State, Inc.*

27—Johnstown, Pa. Handy-size brochure outlines advantages such as labor availability, good transportation facilities, good raw material supply, convenient financing for new plants. *Greater Johnstown Chamber of Commerce.*

ELECTRICAL

28—Magnetic Starters. Catalog EN-150 (16 pages) describes a-c starters for reversing and non-reversing single-phase and squirrel-cage motors. In NEMA sizes 0 through 4. General info, ratings, dimensions. *Cutler-Hammer, Inc.*

29—Metal-Clad Switchgear. Construction and design of 4.16-kv. horizontal drawout switchgear, with circuit breaker, are discussed in 12-pager (18B6346C). Covers outdoor and indoor models, buswork, components. *Allis-Chalmers Mfg. Co.*

30—Switches. This 20-page illustrated catalog (No. 83c) gives details of nine housing groups of metal-enclosed switches. Explosion-proof, maintained-contact, hand-operated switches are among 99 different listings. *Micro Switch.*

31—Connectors. Here's a 6-pager with specs, outline dimensions, other info on printed circuit test point connectors. Available with 1, 6, or 16 conveniently located test points for checking printed circuitry. *De-Jur-Amsco Corp.*

32—Electric Feedrail. Bulletin No. 75 (40 pages) describes track, trolleys, and accessories for electrification of moving equipment. Tells advantages of 100-amp. steel-enclosed trolley busway electrification system. *Feedrail Corp.*

33—Circuit Breakers. Catalog No. 111-PR (32 pages) covers panelboards, switches, motor controls, circuit breakers and enclosures. Photos and wiring diagrams illustrate equipment. Selection info. *Federal Pacific Electric Co.*

INSTRUMENTS AND CONTROLS

34—Saturable Reactors. Bulletin C15-S (4 pages) describes proportioning reactors, transductors, switching reactors, and preamplifiers for static control. Provides dimensional outlines and tables, other details, photos. *Control.*

35—Temperature Controls. This 4-pager (Form No. 1087) introduces a recording pneumatic and an indicating pneumatic temperature control. Instruments control a variety of heating appliances. Application photos. *Partlow Corp.*

36—Dial Thermometers. Here's a 12-page catalog (No. 205) that gives specs for direct and remote reading types in new filled-system thermometer line. Info on four types of filling mediums; other data. *American Machine & Metals, Inc.*

37—Monitor Units. How to get reliable low-cost temperature detection is described in 30-page catalog (3036C). Includes construction and operation details, accessories, wiring diagram, photos. *Thomas A. Edison Industries.*

38—Automatic Count Control. Illustrated 16-page manual explains new concept for solving count control problems. Predetermined counters come in 3 models—selectivities from 1-100, 1-1000, 1-10,000. *Hobson Miller Machinery Corp.*

39—Recorders, Controllers. Bulletin SC-181 is a 6-pager, titled "Autocarb," that discusses the dew point systems of atmosphere control. Tells what they are, what they do, how they operate. Accessories info. *Surface Combustion Corp.*

40—Spectrophotometers. Principles of operation and advantages of double-beam ratio-recording system are given in 12-pager (No. 735). Lists specs, applications, accessories. *Beckman Instruments, Inc.*

41—Comparators. This 4-page catalog (No. 623) presents new line of completely transistorized, precision-measuring instruments. Data includes description, magnifications, gaging circuit, operation, photos. *Pratt & Whitney Co., Inc.*

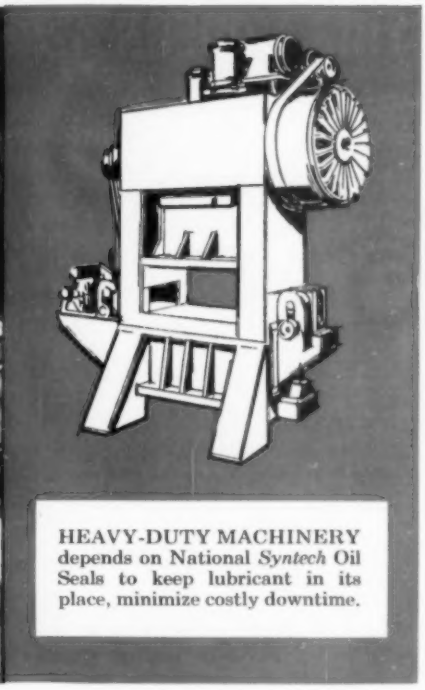
AUXILIARY

42—Filters. Bulletin No. 238 (8 pages) describes three mechanical filters: Type F, Airmat Deep Bed, and Multi-Pak. Includes filter selection tables, performance curves, and photos of full assemblies. *American Air Filter Co.*

43—Air Compressors. This 4-color 12-page catalog (SG-2) discusses one two-stage and two single-stage compressors in sizes from ½ to 15 hp. Available pressures from 80 to 250 psi. Lists accessories. *Westinghouse Air Brake Co.*

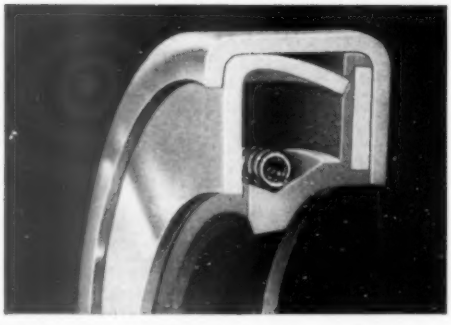
Turn the page

Better products, *faster*, from your National Seal specialist:



HEAVY-DUTY MACHINERY depends on National *Syntech* Oil Seals to keep lubricant in its place, minimize costly downtime.

National "prescription-blends" a synthetic just right for your industrial oil seal application!



National *Syntech* Oil Seals feature: 1. Synthetics "prescription-blended" to meet specific operating conditions; 2. Minimum tension on garter spring to reduce shaft-torque, increase seal life; 3. Accurately sized O.D.'s.

A National *Syntech* oil seal can be formulated to take specific conditions of temperature and shaft speed!

Temperature extremes, shaft speeds, solvent-, fatigue- and abrasion-resistance—these and other factors go into choosing the *best* synthetic for an industrial seal. National can "prescription-blend" a **Syntech** seal just right for *any* job!

Basic ingredients for synthetics developed and perfected by National are compounded by coded formulas. Each batch is mixed and blended separately, then tested and approved before release. A finished "prescription" is extruded, bonded and molded . . . machined to size and assembled into **Syntech** seals that'll save time and money day after day in your machines.

Whether you use synthetics or leather, you can get the industrial oil seal you need—*when you need it*—from your National Seal specialist. Call him today for fast service!

NATIONAL OIL SEALS

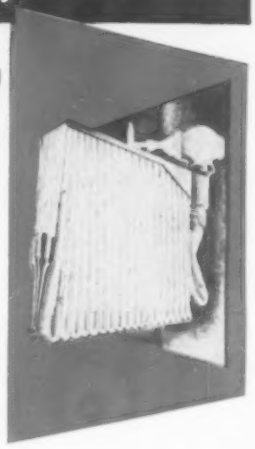
FEDERAL-MOGUL SERVICE

DIVISION OF FEDERAL-MOGUL-BOWER BEARINGS, INC. • DETROIT 13, MICHIGAN

For more facts Circle 571 on Reader Service Card

NEW *Savings*... NEW *Safety*... WITH THIS MODERN *Lightweight* HOSE!

"DRI-RACK"



Greatest Improvement in Fire Hose in Over Fifty Years!

Made with a tightly-woven high-tensile fibre Jacket and a seamless, laminated reinforced rubber lining—thin yet exceptionally strong, tough, durable. Light in weight—flexible—compactly folded or coiled. Sizes: 1½" and 2½", in continuous lengths up to 100 feet.

NO "WEEPING"—eliminates excessive water damage.

HALF THE FRICTION LOSS of unlined linen hose.

All the water goes right on the fire!

CAN BE USED WITH SPRAY NOZZLE—complete freedom from lint clogging.

PERMITS COUPLING TESTS for proper installation—no more "thumb nail" tests.

FITS INTO SAME SPACE AS UNLINED LINEN HOSE

UL FM

Mail Coupon for Complete Information

Goodall Rubber Company Date
452 Whitehead Rd., Trenton 4, N. J.

Gentlemen:

☐ Please send complete information on "Dri-Rack" Fire Hose.
☐ Have representative call with details and prices.

Company _____
Address _____
City _____ Zone _____ State _____
Attention of _____

"If it's GOODALL, It MUST be Good!"

Standard of Quality—Since 1870 HOSE · BELTING · FOOTWEAR · CLOTHING AND OTHER INDUSTRIAL RUBBER PRODUCTS

GOODALL *Rubber Company*

GENERAL OFFICES, MILLS and EXPORT DIVISION, TRENTON, N. J.
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For more facts Circle 572 on Reader Service Card

FACTORY / CATALOG NEWS

Begins on page 206

For more about these items, circle item numbers on Reader Service Card next to back cover.

44—Gas Regulators. Cylinder, manifold, and station pressure regulators are presented in Catalog ADC705F (36 pages). Flow and pressure specs; info on adapters, station valves, flowmeters, other equipment. *Air Reduction Sales Co.*

45—Utility Pumps. Here's an 8-pager (Form CP-3489) on self-priming pumps with high reserve pressure. They're small, lightweight, easy to maintain. Capacities to 50 gpm. *Continental Pump Co.*

46—Roof Ventilators. Illustrated Bulletin No. 4004 (8 pages) describes construction, capacities, quietness levels of centrifugal ventilators. Lists 13 basic sizes. Includes specs, photos. *American-Standard, American Blower Div.*

47—Air Handlers, Conditioners. Two catalogs: No. 382A (12 pages) on air handlers with capacities from 665 to 19,200 cfm.; No. 383A (8 pages) on multi-zone air conditioners in sizes 4060 to 19,200 cfm. *Acme Industries, Inc.*

48—Filters. Continuous filtration of machine tool water-soluble oil coolants is described in 4-page bulletin (FB-103). Removes abrasives, dirt, other solid contaminants with minimum coolant loss. *U. S. Hoffman Machinery Corp.*

PRODUCTION

49—Phosphating Method. Advantages of the steam-cleaner phosphating method are outlined in 16-page manual (Form No. PS-1). It's titled "How to Clean and Phosphate Metals in One Operation at Low Cost." Illustrated. *Malsbary Mfg. Co.*

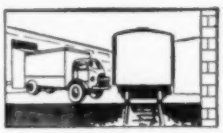
50—Magnetic Drill Stands. This 4-page bulletin (No. 10406) describes precision drilling possibilities in difficult or remote areas. Gives info on three new presses for air or electric drills up to 2-in. capacity. *Thor Power Tool Co.*

Turn the page

There's a big difference . . . in fuel costs . . . in employee morale . . . in productivity of workers . . . in absenteeism due to colds or accidents . . . in protection of merchandise.

Only DAZZO Dock Shelters provide quick and full protection for dock operations in bad weather. Less than full protection is merely money wasted!

DAZZO Dock Shelters adjust themselves automatically to different dimensions of railroad cars or trucks. They expand in seconds by gravity, without use of springs. They retract out of the way when not in use.



Save *money* and *grief* . . . write for the facts about DAZZO Dock Shelters today!

DAZZO PRODUCTS, INC. 152 Bleecker St., N.Y., 12, N.Y. ORegon 3-5298

For more facts Circle 573 on Reader Service Card

Reduce Grounds Keeping Costs

A job-designed Myers sprayer gives you mechanized power to protect your grounds investment. Wide range of sprayer models available. Write today for illustrative catalog, Section 380.

Myers

The F. E. Myers & Bro. Co.
ASHLAND, OHIO KITCHENER, ONTARIO

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A PRODUCT IS KNOWN BY THE COMPANY IT KEEPS

North American Aviation • Coca Cola • Great Lakes Steel Corp. A.C. Sparkplug Co. • Owens Corning • Briggs & Stratton • Hercules Powder • Monsanto • American Can • New York Central • Liquid Carbonic Corp. • Formica • General Box Co. • Swift and Company Continental Can • Hoover-Allison • Crosley Division • Pennsylvania Dept. of Highways • General Tire • Wyeth Laboratories Cleveland Graphite Bronze • Mallinckrodt Chemical • Pabst Brewing • Olin Mathieson • Schlitz Brewing • Falls Stamping & Welding • Philadelphia Gas Works • Ohio Metal Co. • Oldahy Packing General Electric • Addressograph-Multigraph • New York Public Works • Joy Manufacturing • H.K. Ferguson & Co. • Sperry Gyroscope • Gerber-Ogilvie-Baby Foods • Eastman Kodak • Allied Chemical & Dye • National Dairies • Linde Air Products • Chatfield Paper • Westinghouse Electric • Goodyear • Lewis-Harris • Maryland Fiber • U.S. Shoe Company • Pittsburgh Plate Glass • General Motors • F.H. McGraw • Armour • Baltimore Smelting • General Aniline • Timken Roller Bearing • Hoperidge Farms • Dow Chemical • Picker X-Ray • B.F. Goodrich • Standard Oil Chevrolet Motor • Norton Company • Sun Oil • H.K. Porter Co. General Mills • Columbia Records • James B. Clow & Sons Chrysler Corp. • Thompson Products • Ford Motor • Allis-Chalmers • Bakelite Co. • Merck & Company • Eli Lilly Co. Sealtest Power • duPont • Cadillac Motor • National Carbon Co. Philadelphia Gas Works • The Glidden Company • Reynolds Aluminum • U.S. Radiation Laboratory • University of California Paramount Foods • Pan American • International Printing Ink Groves-Kelco • The Tupper Corporation • A.C.F. Industries • Allen Products • State of New Jersey • Belden Brick Company • State of New York • Western Electric • Brookhaven National Laboratories Alsco • Boeing Airplane • Elizabeth Arden • Borden Company Goodyear Atomic Corporation • Surface Combustion • U.S. Atomic Energy Commission • City of Cincinnati • J.H. Day Company DeJur Ansco Corporation • Agfa, Incorporated • Eaton Manufacturing • Standard Chlorine • Johnson & Johnson • Celanese Corporation • Johnson Bronze Company • Mueller Company Knolls Atomic Power Laboratory • Sears Roebuck • Haughton Elevator • Titanium Metals Corporation • Gulf Oil • U.S. Department of Agriculture • Western Electric • Convair • Great Lakes Steel Corp. • Delco • Best Foods • University of California • Upjohn Co. • Avon Products • Graybar Electric • National Lead • Visking Corporation • Campbell Soups • Goodyear • Thompson Products

You know these names . . . and we are proud to say we know them as our customers. Each is a user of TUBAR Materials Handling Equipment. If you are not already on this list, it will pay you to check into the exceptional advantages of TUBAR Dumpers, Lift Trucks, and Cranes.

We design and build to Your Specifications!

Tubar
ASSURES QUALITY
UNARCO, INC. • DENNISON, OHIO
LIFTS • DUMPERS • CRANES

U-159-10

For more facts Circle 575 on Reader Service Card

SPENCER Vacuum

Assembly and Gaging Dept., Miniature Precision Bearings, Inc., Keene, N. H.

KEEPS "WHITE ROOMS" WHITE

Dirt and dust are strictly bad news around gaging or assembly areas of a company producing precision ball bearings. Every possible precaution must be taken to assure an absolutely dust-free atmosphere in the "white rooms".

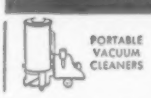
That's why, at plants like this modern Miniature Precision Bearings, Inc. factory, you'll find SPENCER vacuum cleaning systems providing *sure* sanitation.

Whether your cleanliness requirements are critical . . . or whether *convenience* and *economy* of maintenance are primary, you'll find a SPENCER system the answer to your needs.

Write for complete information on SPENCER installed vacuum cleaning systems or request a piping layout to meet your particular requirements.

The SPENCER TURBINE COMPANY
HARTFORD 6, CONNECTICUT

OTHER QUALITY SPENCER PRODUCTS



PORTABLE VACUUM CLEANERS

PNEUMATIC CONVEYING SYSTEMS

BLOWERS

FACTORY / CATALOG NEWS

Begins on page 206

For more about these items, circle item numbers on Reader Service Card next to back cover.

51—Welded Assemblies. Here's a 60-page catalog with extensive info on various types of welded assemblies. Lists 94 materials maker has welded, including carbon and stainless steels, aluminum, etc. *The American Welding & Mfg. Co.*

52—Cutting Tools. Reamers, drills, end mills, counterbores, other tools are shown in 72-page catalog (No. 59-A). Gives grinding and operating suggestions, selection and dimensional tables, other technical data. *Wendt-Sonis Co.*

53—Abrasive Hard-Gear Finisher. Here's a 4-page bulletin (No. 999) that tells how the finisher works. Includes info on crowning, machine construction, optional equipment, cutting fluid. Gives specs, photos. *Michigan Tool Co.*

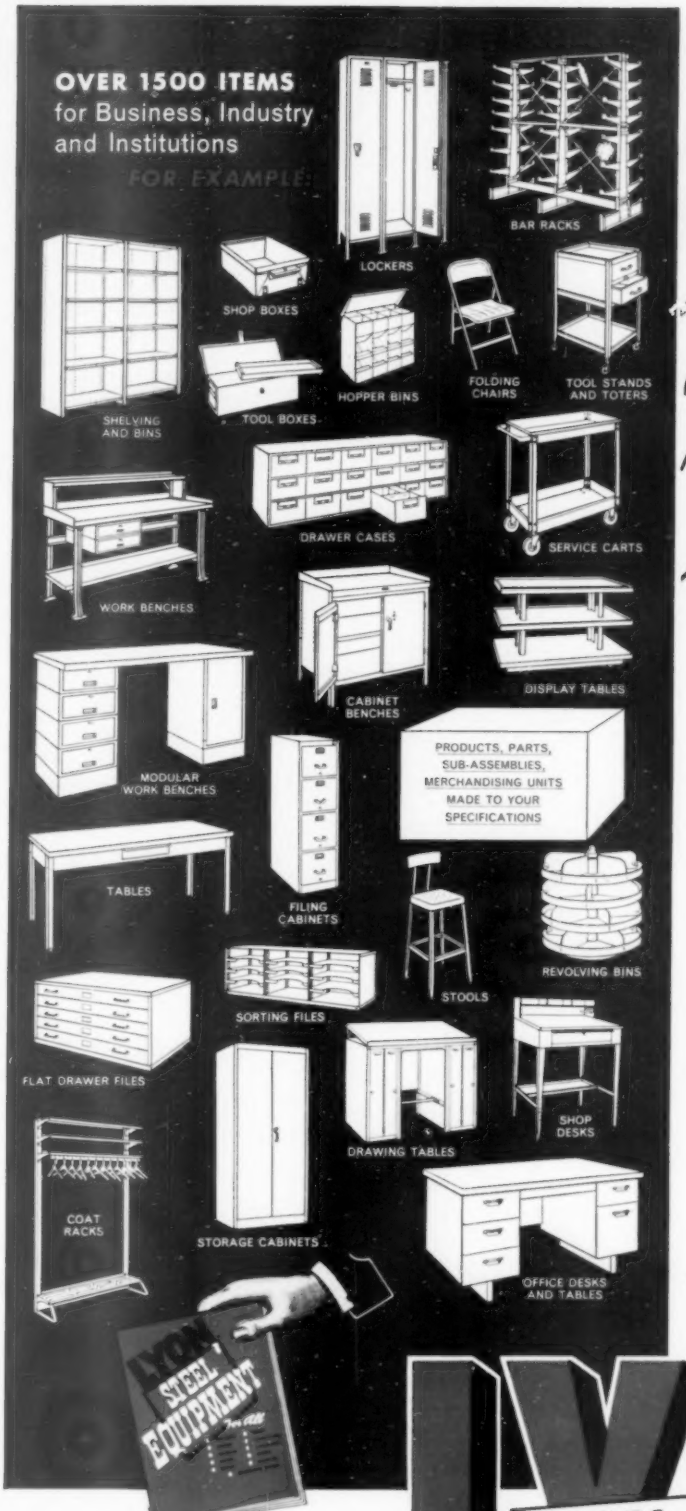
54—Forgings. This 36-page booklet (Form 22-11184) describes equipment and services for producing aluminum and magnesium forgings. Has info on new forgings said to require little or no machining. Photos. *Aluminum Co. of America.*

55—Precision Tools. Bulletin M81 (20 pages) illustrates tools said to be new in concept or design to give greater accuracy, easier use. Products include permanent magnet chucks, tool setting and radius gages, edge finders, sine plates. *Brown & Sharpe Mfg. Co.*

56—Lapping-Polishing Machines. Catalog PO-50420 (4 pages) explains and illustrates vibratory lapping-polishing method. Machines provide easy mechanical polishing. Five models, with from 5- to 30-in.-dia. lapping pans. *Syntron Co.*

57—Drilling Machines. Turret drills and floating tool holders are described in this 4-pager. Gives info on hand-operated, radial type, automatic hydraulic, numerically tape-controlled, and special type machines. All feature power indexing. *Burg Tool Mfg. Co., Inc.*

Turn the page



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FACTORY / CATALOG NEWS
Begins on page 206

For more about these items, circle item numbers on Reader Service Card next to back cover.

MISCELLANEOUS

58—Copying Systems. "4 Versatile Office Time-Savers" is a 16-page booklet (Fl-106) that shows usefulness of these business tools. Includes suggestions for increasing efficiency in offices of various plants. *Eastman Kodak Co.*

59—High-Speed Printer System. Here's a 4-pager (Bulletin 5221) that describes transistorized system for printing copy direct from computer or from magnetic tape at up to 1500 lines per minute. Edits automatically. *Burroughs Corp.*

60—Food Service Equipment. Many answers are given in 8-page pamphlet "Why Hire a Food Service Consultant?" Outlines steps in practical planning of layout, installation, selection of kitchen equipment. *Lincoln Mfg. Co., Inc.*

61—Welding Equipment. High-speed hand-welders for thermoplastics are illustrated in this 4-page bulletin. Gives welding speeds and strengths, construction information, accessories, special equipment. Photos. *Laramy Products Co.*

62—Precision Gears. Bulletin GEA-6430 (24 pages) describes gears in sizes ranging from under 1 in. to over 200 in. in diameter. Applications include high-speed gear units, guidance control gears, others. *General Electric Co.*

63—Integral-Shaft Sheaves. Here's a 6-pager (20B7897B) covering construction and operation of sheaves for low-cost stepless speed control in large machine drives. Includes dimension tables, photos. *Allis-Chalmers Mfg. Co.*

64—Architectural Aluminum. This 12-page booklet (OA-18) describes aluminum alloys used in mill products as building components and materials. Gives info on special finishes available with aluminum. Table gives properties of alloys. *Olin Mathieson Chemical Corp.*

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Here's Your Answer to the Small-Repairs Problem

MAINTENANCE WORK PLAN

Job No F-9589 Dept. No 88 Ordered by Kittridge

Job Install gaskets Date 4/8/58

Bldg. 88 Floor 1st Equip. or Area #1 Rotary Drier

Equipment Part or Location Feedscrew and manhole

Materials Required Rubber gasket, material cement

Tools and Equipment Required Regular tools

Permits and Safety Precautions Lock out drier

Production Supervisor Philpott Engineer Koenniger

Shutdown Arrangements Drier is down.

Work to Start 8:00 Estimated Completion Time 4:30 Est. Manhours 16

Mill-wright	Mach-inist	Welder	Rigger	Carp-enter	Sheet Metal	Pipe	Elec-trical	Painter	Area Mech-anic	Yard	Other
2											

Men Assigned McLean & Godmn

Work Description Make five gaskets for feedscrew cover and manhole opening on inlet end of drier. There are several air leaks that have to be sealed off. Gasket will be cemented to metal. Install new felt to seal at feed end of drier.

Disposal of Removed Parts, etc. none

Check Follow Up--Clean Up OK

Work Completed--Time 4:30 Accepted by Kittridge Total Manhours 16

Job Closed--Date 4/8/58 Time 4:30 Foreman K. Mowery

This simple planning sheet (facing page) is your surest clue to . . .

Cutting Costs on Small Repairs

It's a better way to handle those bothersome small jobs. It will put order and efficiency into scheduling and supervising—and slash your costs.

SEVERAL of our maintenance foremen here at Monsanto-Springfield are holding down two jobs. But not at the same time. As a two-man team, for one whole day one of them acts as work planner, the other as job supervisor. Next day the roles are reversed. Then back again. The simple control element is the work plan (facing page).

Reason for this seesaw switch is the need for better planning of small repair jobs. We'll go more deeply into that later. Outcome has been a healthy cut in small-job labor costs —at least 15%. And critical jobs are completed within two elapsed days compared to a former range of three to seven days.

In addition to these tangible benefits the plan has shown other bonus advantages:

- The number of men per foreman is determined by the number of men a foreman can adequately plan for, rather than by a rule-of-thumb average. We needed no additions to the total number of foremen, because a team of two foremen can plan and supervise the work of roughly two former independent crews.
- Engineers are freed of the detail involved in planning and following through on routine minor jobs. Thus they are available for a greater amount of engineering work.
- The plan provides a workable method of multi-craft supervision.
- It is an effective way of training our foremen in job planning.
- By giving the foreman more responsibility and authority (which he did not have when limited to supervisory duties), the plan adds to his prestige and job satisfaction.
- The work planning procedure—the most important part of each repair job—is done by the foreman who will supervise the job.

It was this last attribute that led us to dub the plan as our "GRMC" plan—our abbreviation for Grass-Roots Maintenance Control Plan. It retains all the benefits of the basic concept of dividing workers into planners and doers. But by using as planners the men who also are doers, it wrings out an extra percentage of efficiency in performing minor repair jobs.

By C. E. KNIGHT, General Supt. Engineering and Manufacturing Services Plastics Div., Monsanto Chemical Co. Springfield, Mass.

PROBLEM: RISING COSTS

About four years ago our maintenance cost indexes started to rise. We regularly check maintenance costs three ways: as a percentage of capital assets, in dollars per $100 total conversion cost, and in dollars per 1000 pounds produced. These indexes had shown gradual long-term reductions in the face of rising labor and material costs. The reductions were gained by such management techniques as work planning, job scheduling, preventive engineering, improved job instructions, and area assignments.

To find out the reason for the cost rise, we checked the status of our maintenance costs in three groups that make up the whole: major repair jobs, minor repair jobs performed by area groups, minor repair jobs performed by central craft groups. This study revealed that cost of major repair jobs was constantly improving, but cost of minor repair jobs (under $150) was rising.

Big jobs, lower cost—Further study gave us reasons for the improvement in major repair work:

- Our scheduling system (begun some five years before) was constantly improving and was most effective on major repair work. Work planning was an essential part of it.
- Because time schedules and costs are estimated on major jobs, these jobs received priority among engineers and foremen.
- Engineering improvements on repair methods were notably effective for any jobs that were large enough to be estimated.
- Engineering revisions to equipment reduced the frequency of many major repairs—and even eliminated some of them.

Area jobs, high efficiency—A review of minor repair operations by area mechanics disclosed a high order of efficiency. This was to be expected because of the following inherent advantages of such a system:

- Area mechanics and foremen are stationed in plant areas close to work, have their own cribs there.
- Men are familiar with equipment and operations.
- Crews are motivated by identification with productive units.

Minor jobs, rising costs—The big cause of our cost rise therefore was in minor repair jobs being done by central craft groups. Such jobs make up 55-65% of the labor cost of all work by these groups. Further analysis of our methods of handling this type of work showed that it needed better planning and scheduling to match the good results in the other two work categories. In short, each minor repair order needed its own planning and scheduling.

Turn the page

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RIVITORS... AIR AND HYDRAULIC CYLINDERS... CUTTERS... CLINCHORS

COST OF SMALL REPAIRS

Begins on page 216

GRASS-ROOTS SOLUTION

Any acceptable solution would have to dovetail with our procedures for handling major repairs and area work. About nine years ago we had set up a planning and scheduling system for all central craft maintenance work ("How We Schedule Maintenance by the Week," FACTORY, October 1951). This system has become a way of life at Monsanto.

Heart of the system is a schedule board that keeps track of every repair job—whether a major repair or an MRO (minor repair order). But only important MRO's were scheduled individually in the same way as major jobs. Unimportant MRO's were grouped in a lump sum at the end of the board under a heading of "Miscellaneous MRO's." The board showed only the total number of men in each craft assigned to this batch of minor jobs. Such MRO's were doled out to craft foremen handling that type of work. If it was a multi-craft job, the dominant craft foreman had to work out his own cross-craft coordination.

At the time Monsanto found no reason to control this miscellaneous pool in the same detail as was essential for important MRO's or major jobs. Management withheld such action on the theory that individual scheduling would be easy enough to do, if necessary, by using a similar supplementary board to give the same degree of control.

Had the time now come to take such action? Was this the best solution to our problem? No. We didn't relish the unwieldy procedures of such detailed control over 100 to 150 new MRO's each day. Administrative costs would no doubt be high. The communications problem of fast-changing jobs would be difficult. We concluded that a system of close control at long distance just wasn't feasible. Only way it could be done was at arm's length.

HOW THE PLAN WORKS

It was this sort of reasoning that led our maintenance superintendent to the GRMC concept. In brief, it now operates this way:

Two foremen alternate daily in

Turn to page 222

For more facts Circle 580 on Reader Service Card

For more facts Circle 581 on Reader Service Card ➤

Good bet: You're paying for lubricants you don't need

Does this case sound familiar to you?

A midwest firm was buying lubricants on the recommendation of every department head, foreman or even operator. Inventory — often duplicated — was scattered all over the plant, yet shortages in one spot were never related to overstocks in another. The result: costly overstocking, extra handling, increased dangers of misapplication.

Management then instituted an Organized Lubrication Plan. Now they use 20 lubes instead of 97, have cut their purchase orders from 300 to 12 per year. Direct savings are estimated at thousands of dollars annually.

Can Organized Lubrication save money in your plant? Contact your local Texaco Engineer or write for "Management Practices that Control Costs via Organized Lubrication." The Texas Company, 135 East 42nd Street, New York 17, N. Y., Dept. F-81.

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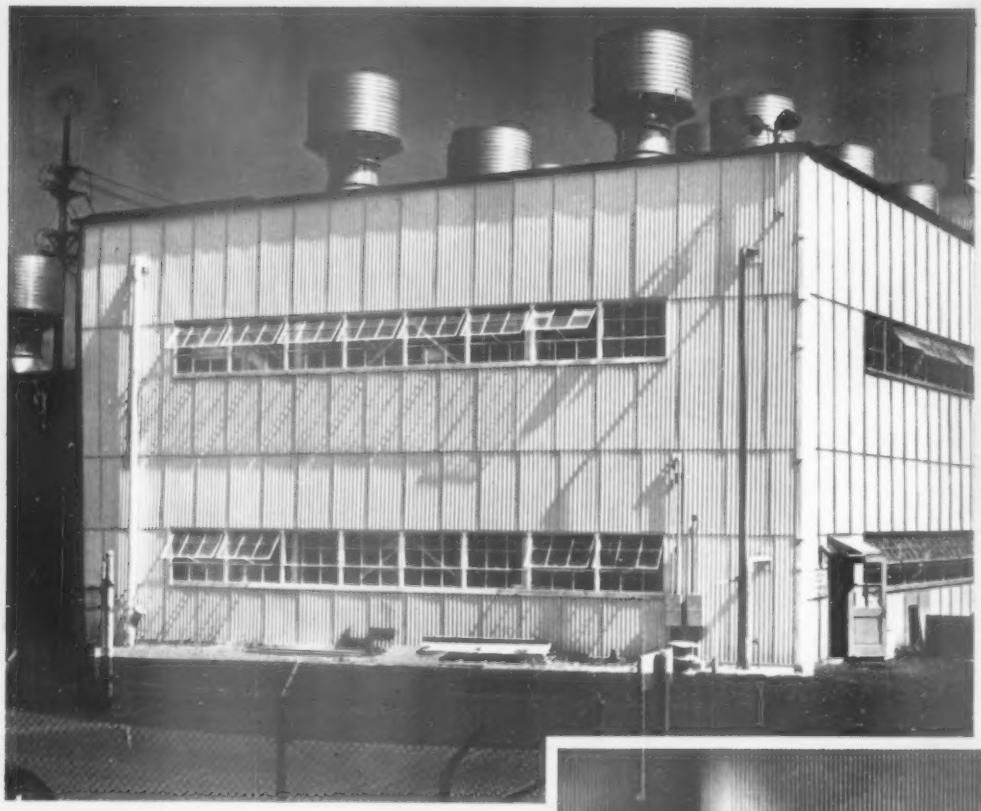

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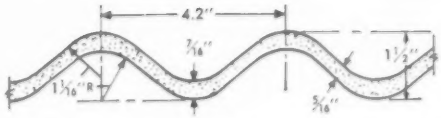
Made of two practically indestructible materials—asbestos and cement—Corrugated Transite looks and wears like stone. It actually becomes stronger and tougher with age. It can't burn, can't rot, can't rust.

Used for outside walls or roofing, Corrugated Transite is weatherproof and durable, requires practically no maintenance. Large sheets, low in first cost, require a minimum of framing, permit fast and inexpensive construction of industrial buildings as pictured above.

In the hands of an imaginative architect or engineer dramatic decorative effects can be obtained as in the case of the interior walls of the college auditorium illustrated at the right.

The natural color of Corrugated Transite is a light stone gray but it can be easily painted. Sheets can be combined with other building materials for contrast, variation or directional accent.

For a 32-page illustrated booklet, "CORRUGATED ASBESTOS TRANSITE," write to: Johns-Manville, Box 158, New York 16, N.Y. In Canada, Port Credit, Ont.



Corrugated Transite is available in sheets 42" wide (10 corrugations). Standard lengths are from 3' 0" to 12' 0" in increments of 6". Curved units are manufactured to order. Corrugated Transite may be applied to steel or wood framing.

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JM

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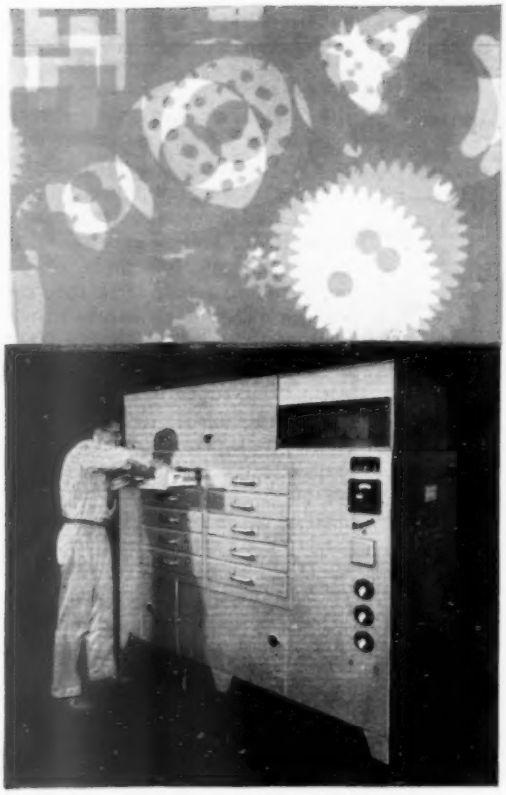
For more facts circle 582 on Reader Service Card

New oven dries Zytel for perfect miniature parts*

Raw Zytel Nylon can pick up at least 2½% moisture just waiting to be molded. The result is miniature and sub-miniature parts that bubble. ● This was a serious problem to United Fabricators, Stillwater, Minn. ● Some of the companies they serve are Bell & Howell, Sylvania Electric, Revere, Longines-Wittnauer and the builders of the Falcon Guided Missile. All exacting customers who won't permit deviations of even thousandths of an inch. ● United Fabricators solved their problem with the new Despatch PLHD-2-5 Preheating and Drying Oven. ● Number 101 Zytel Nylon resin granules are ground up and dehydrated at 175° in the oven. A dessicator removes the moisture from the air. The result is Zytel with less than .2% moisture content, ready to mold into stable miniature and sub-miniature parts. ● If you have a similar problem, don't forget that Despatch, the giant of the heat processing industry, is also the leader in laboratory and drying ovens. Despatch can provide you with *any* type of drying oven ready-made or custom-engineered to your exact specifications.



**"Zytel" is a Dupont Registered Trademark*

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DESPATCH

Austin-Western model 210 hydraulic crane speeds loading of processed railroad ties onto flat car.

A-W hydraulic crane saves time and money—proves versatile materials handling tool

Austin-Western's hydraulic crane is " . . . more efficient, faster and easier to handle than a smaller capacity fork lift or much larger locomotive crane!" So says Wm. L. Groff, manager of the Huron Wood Preserving Division of the Detroit and Mackinac Railway, Tawas City, Mich.

Proves efficient

He adds, "We began using the crane two years ago to speed handling of ties, poles and timber in our pressure treating process. It proved so versatile and efficient that we use it for all kinds of materials handling."

Mr. Groff states that it used to require 2 to 2½ hours for three men and a forklift to unload processed ties from trams used in treating. Final loading onto flat cars called for an hour's time of a large locomotive crane and 4-man crew. The A-W crane now does both operations in less than 2 hours.

Costs are below estimates

"Our A-W crane with 4-wheel drive and 4-wheel steering is highly maneuverable," he says. "It goes almost anywhere . . . over track, under doorways or piping.

"Maintenance and repair costs have been much lower than the $3.61 average daily allowance set up in our cost table. It is used an average of 5 hours daily, at a cost of only $27.03!"

The unit is rubber mounted, self-propelled. Choice of power. 18-ft. telescoping boom rotates in full circle. Wide selection of optional attachments gives added versatility. Get documented facts and figures on the A-W materials handling cranes in the Huron Wood Preserving Division operation. Write today.

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Power graders • Motor sweepers • Road rollers • Hydraulic cranes

222 For more facts Circle 584 on Reader Service Card

Begins on page 216

planning the work for a single crew and in supervising the work they have planned. A GRMC crew averages about 20 craftsmen, including millwrights, pipers, electricians, sheetmetal men, carpenters, pipe coverers, and (as needed) riggers, welders, and painters.

Crew size and make-up is not static—it can vary from 10 to more than 20 men as required. The craftsmen retain their identity with the central shop craft, but are assigned from the central group for an indefinite term to work in a particular area under GRMC foremen.

At the start we tried out the plan in one of the four plant areas some two years ago. It worked so well that it has now been extended to a second area.

The GRMC groups are not to be confused with area mechanic groups, which have their own cribs and their own foremen. Area groups are confined to one area, perform specific work in keeping equipment running as required by union agreements. The GRMC groups encompass all crafts and have few limits to the type of minor repair work they can perform. They don't handle instrument repair work. Size of all GRMC jobs is limited, of course, by the MRO itself (under $150).

Local planning and scheduling—The central planning clerk makes every effort to get a maximum number of the MRO's (which are not handled by area mechanics) into the hands of a GRMC foreman. Such MRO's still do not get on the central scheduling board as such. They are sorted out by the clerk and the batch is sent directly to the GRMC group. The craftsmen assigned to a GRMC group, however, appear as such on the central board in a lump-sum, craft-by-craft figure. Thus all central-shop craftsmen are always fully accounted for. In short, GRMC has not affected the scheduling board as originally set up. It relies on subsidiary planning and scheduling at the local level.

Here's how the two foremen team up to make GRMC work:

Day for planning—During his day for planning and scheduling the one foreman follows this program. . .

• Visits production supervision and

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  2. Rigid stem liquid filled insertion element. Temperature range −30F to 300F.
  3. Rigid stem liquid filled immersion element. Temperature range −30F to 300F.
- All elements are fully interchangeable.
- Pneumatic follow-up movement (feedback) assures stable, highly accurate response at lowest required sensitivities. Sensitivity is adjustable.
- Unaffected by ambient temperature or static head. Remote bulb may be located at any point above or below thermostat.
- Proportional action.
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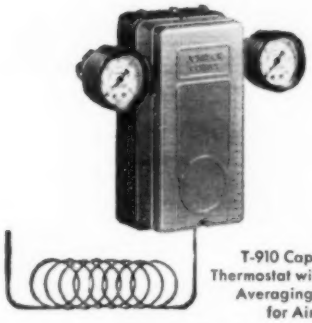

T-910 Capillary Thermostat with 8-foot Averaging Bulb for Air.

T-902 Rigid Stem Insertion Thermostat for Air.

T-904 Rigid Stem Immersion Thermostat for Liquids.

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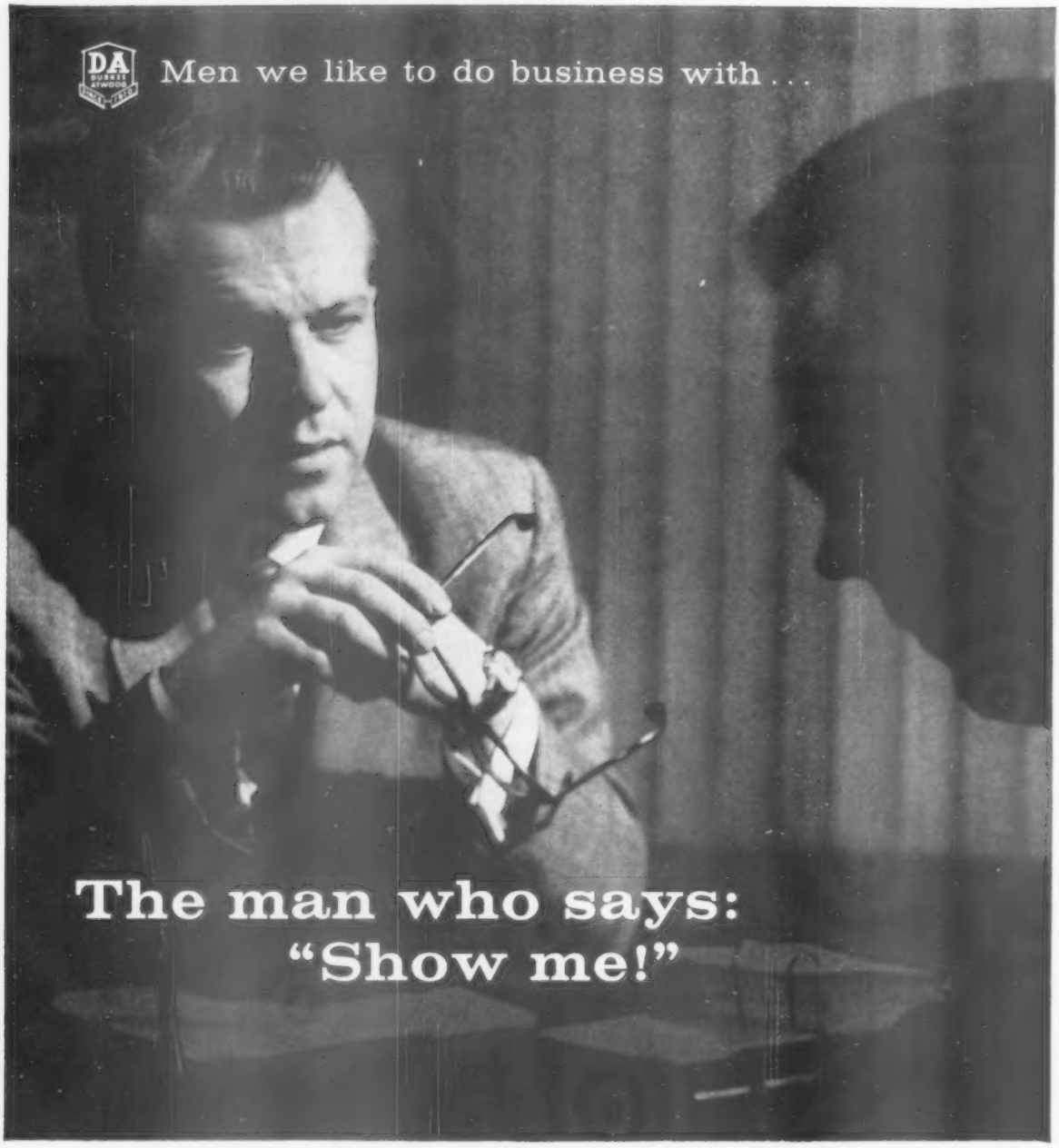

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COST OF SMALL REPAIRS . . . *Begins on page 216*

reviews the workload, determining job priorities.

- Studies the job in the field, determines safe and proper method of execution, and estimates needs—time, crafts, materials, and tools.
- Lays out proposed schedule for following day to minimize equipment outages and use crew effectively, and arranges for permits, cleaning, and the like.
- Arranges with central control office for any extra crafts needed for safe and proper handling of work.
- Consults with the area engineer on any engineering problems for which he needs help.
- Fills out a "Maintenance Work Plan" (page 216) for each job, to make sure nothing is overlooked.
- Revises his schedule late in the afternoon to allow for the completion of any work not finished by the crew on his planning day. No formal scheduling sheet is used—the planning sheets are marked as to order of jobs.

Day for supervising—The next day this foreman does these jobs:

- Assigns jobs to the crafts. He often does this at the close of his planning day. He makes revisions in schedule forced by any emergency.
- Inspects jobs to see they are started safely, properly, on time.
- Visits job sites at frequent intervals to check workmanship, methods, and application; and revises his schedule to match progress.
- Examines jobs for proper completion, reassigns craftsmen, notifies production supervision, and completes his work plan.
- Checks production operation after start-up.

Actually the 50-50 time split between work planning and its execution by the same foreman doesn't always work out that way. Sometimes a job is not completed the same day—or there are leftover jobs. If there is a carryover job that has required special planning, a foreman can continue to supervise it on his planning day while the second foreman adjusts his workload for reduced manpower. But if the job is more or less routine, the second foreman can pick it up by revising his own schedule to include it under his supervision.

With the more accurate scheduling made possible by better planning, this carryover situation is minimized and presents no problem. What's more, both foremen operate as a team with the single interest of completing the work assigned to their GRMC group.

Now we've reached the polishing-up stage. We've provided a headquarters location for each group—a desk, telephone, and some lockers—in a production area. We're considering a small maintenance shop in each area. And we're experimenting with a half-time GRMC—that is to say, splitting time of a group between two areas. There's no question in our minds that GRMC is here to stay. **END**

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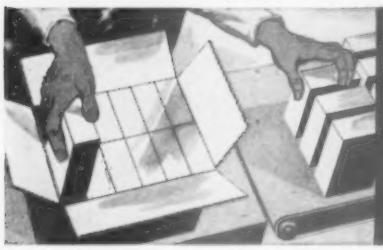

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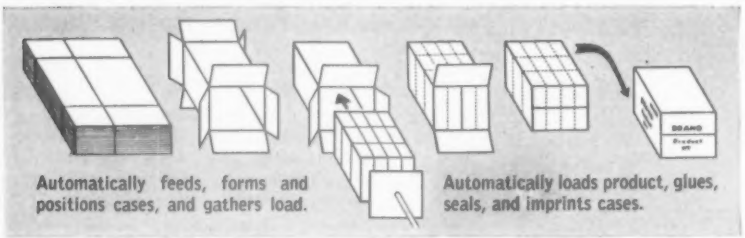

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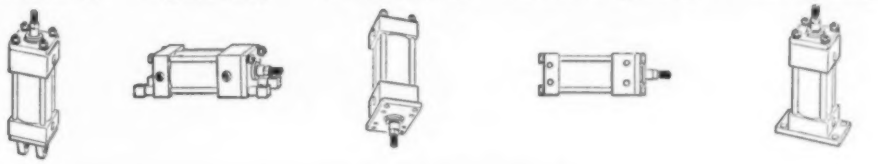

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Newest refrigerator-box material is a sandwich. Everything is changed. No big presses, heavy handling, subassemblies. All that's needed is . . .

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easy folding to shape . . .

How New Materials Hit a Plant

An all-new product is revolutionizing every corner of this plant, every manager's job. Such swift change could hit you next. Here's help in meeting it.

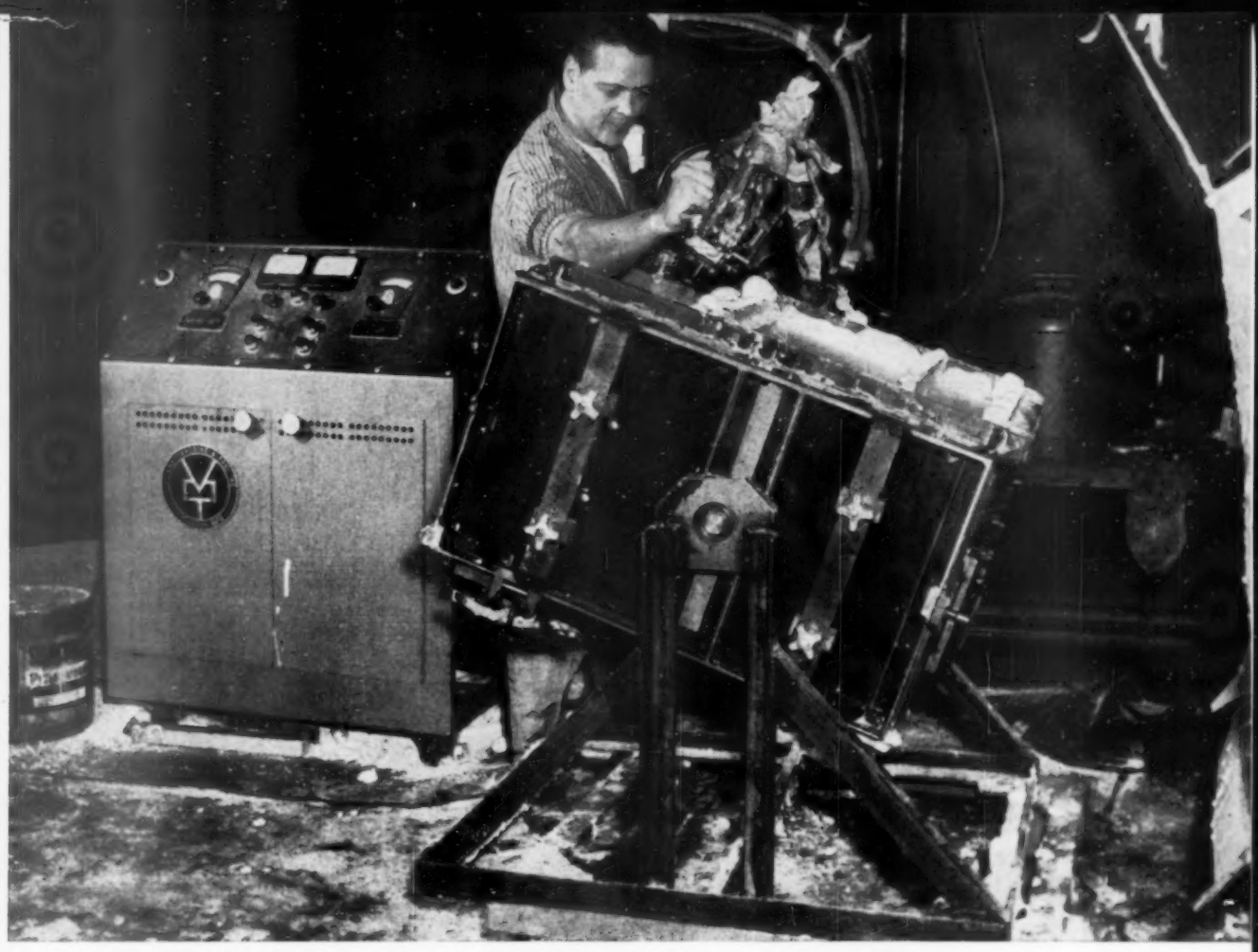
YOUR PLANT could be next in line for a revolution in manufacturing techniques. Like the revolution now in its early stages at Westinghouse Electric Appliance Division (Columbus, Ohio). The story has just been revealed.

Two months before the photos on these pages were taken, the brand-new sandwich-type refrigerator box in the last photo (facing page, lower right) couldn't have been produced. Why? Because there just wasn't any equipment for performing the most critical job—filling the joints with polyurethane (top photo, facing page). Yet if this new kind of refrigerator wins a market, it could dominate the plant's production process in a few short years. If that happens, return visitors won't know the place. They'll find dozens of changes, demonstrating the turn-on-a-dime flexibility you'll need in your own plant to use today's (and tomorrow's) new materials.

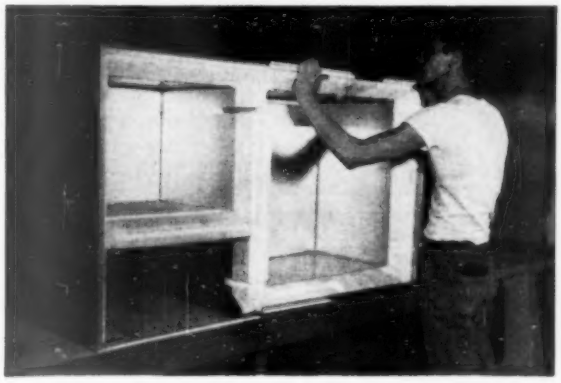
Now we'll tell you of 10 ways this change could hit this plant.

1. DIFFERENT EQUIPMENT

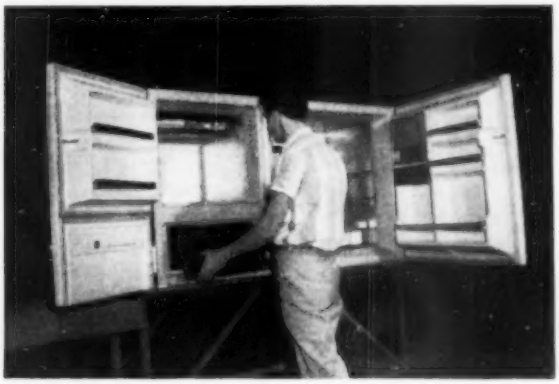
Saws, routers, and simple tools and fixtures are all that's needed to make Westinghouse's new refrigerator box. For oldtimers in the refrigerator-making business the saw and router are like a voice from the past, because old-time wooden refrigerator boxes were made on the same type of equipment. When the stamped steel icebox took hold, saws gave way to presses. Now saws have their chance to sing again.



plus filling and sealing with polyurethane . . .



addition of simple molding . . .



and a few finishing touches.

2. NEW LAYOUT

The new boxes are folded—just as if they were cardboard containers. So layout for shaping the new material is different from layout required by conventional refrigerator boxes. Conventional boxes are made in layouts designed for components. The inner box, for example, is made in a series of steps—tops, sides, doors, backs are all made separately. Then these components converge at the assembly line.

The new sandwich material is far less complicated. Simple, short-line layouts are best for it.

Turn the page

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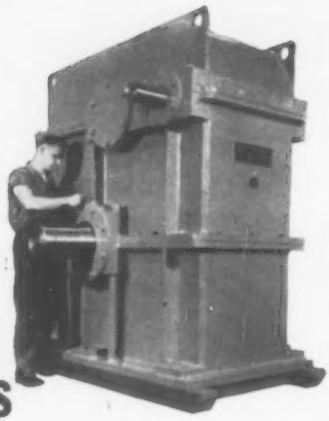

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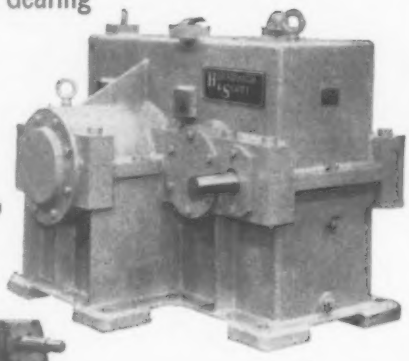

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HOW NEW MATERIALS HIT
Begins on page 228

3. CHANGED MAINTENANCE

Biggest changes in the maintenance pattern will come about because the equipment is lighter. The new product requires no heavy presses. The finished product is lighter. So's handling equipment. Generally speaking, the plant will be much easier to keep clean because there'll be less welding and fewer operations with greasy lubricants.

4. MADE-OVER MANAGERS

Production managers could well find themselves with more control of the finished product—and more responsibility, too. The old practice of having a manager for a function (sheetmetal or painting, for instance) will not make sense. A superintendent will be responsible, instead, for complete fabrication of boxes of a particular size or type. His men will take raw material and transform it into a finished product.

This means a broader job, more direct responsibility. And it could mean an end to those interdepartmental squabbles.

Of course the trend to more decentralized in-plant management will not continue all the way. A separate department probably will continue to supply the mechanical components. And if volume rises high enough, Westinghouse might bring in its own anodizing equipment. Anodizing probably would be done under a separate manager.

5. NEW QUALITY PROBLEMS

A repairman can't get inside a bonded sandwich to dig out dents. Quality control is a knotty problem. The new material becomes scrap if it's marred. Westinghouse is seeking the answer in padded handling devices and worker training.

This is a new kind of quality problem. It reveals a trend that shows up crucially in today's missile business. One mistake ruins the whole show. There's no chance to do it over. The same principle applies here. Manufacturing reliability takes on some of the flavor of performance reliability —a flavor that's sweeping the thinking about quality-control these days.

Turn the page

You know how to make it — we'll show you how to mark it

When a new product has to be marked — or the imprint on a present one improved — how do you solve the problem? Perhaps you've tried building your own marking equipment, and later found the results didn't justify the investment in engineering time and money. Possibly existing equipment was modified to do the job, or a "quick bargain" machine was bought — and the price paid was poor marking quality, inflexibility, or production delays because of a slow process.

Every one of these pitfalls can be avoided by a single step: call in a Markem field engineer at the start. He'll study what you have to mark, ask a lot of questions about how many and how fast, what handling your product gets, how often the imprint must be changed, whether you want marking to be a separate operation or right in your line. Then, after thorough study by Markem, he can tell you *exactly* what Markem machine, type and specialty ink is best for your job, how fast they will mark your products and how much it will cost.

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HOW NEW MATERIALS HIT
Begins on page 228

It calls for new controls, new care in the design of manufacturing tools and equipment, more time in design and manufacturing engineering.

6. DIFFERENT HANDLING

Lighter products, bigger losses from handling errors, shorter production lines—all add up to new concepts in handling. Present high-level storage conveyors may be usable—or may have to give way to something different. The answers may come from different industries —aircraft, toys, bakeries, etc.

7. NEW-STYLE ECONOMICS

Gil Ritter, manager of facilities planning at Westinghouse-Columbus, feels the flexibility and low tool cost of the new product is the big trend indicator for production managers. Fairly high material costs now make the sandwich design most economical for low-volume (fewer than 12,000 boxes per year) models.

But as the material finds wider use for buildings, aircraft, trucks, cabinets, and boxes, the price will drop. And as better methods are found, manufacturing costs may drop.

The point is, the manufacturing man must keep recalculating the economics of competing designs. In three years, Ritter guesses, the new design might be cheaper than conventional ones for runs up to 40,000 units per year. Ritter says: "You can't sit back and figure you've made a lasting decision. The variables can change almost overnight."

8. NEW TYPE WORKFORCE

Today's trend in labor is toward fewer direct employees, more indirect. But it's reversed by this new process. Skill requirements also are simpler. It means this for you: When you take up a new material or process, don't count on trends.

9. NEW RELATIONSHIPS

Three years ago the Westinghouse engineering development group put on a demonstration at the plant—built a sandwich refrigerator box on

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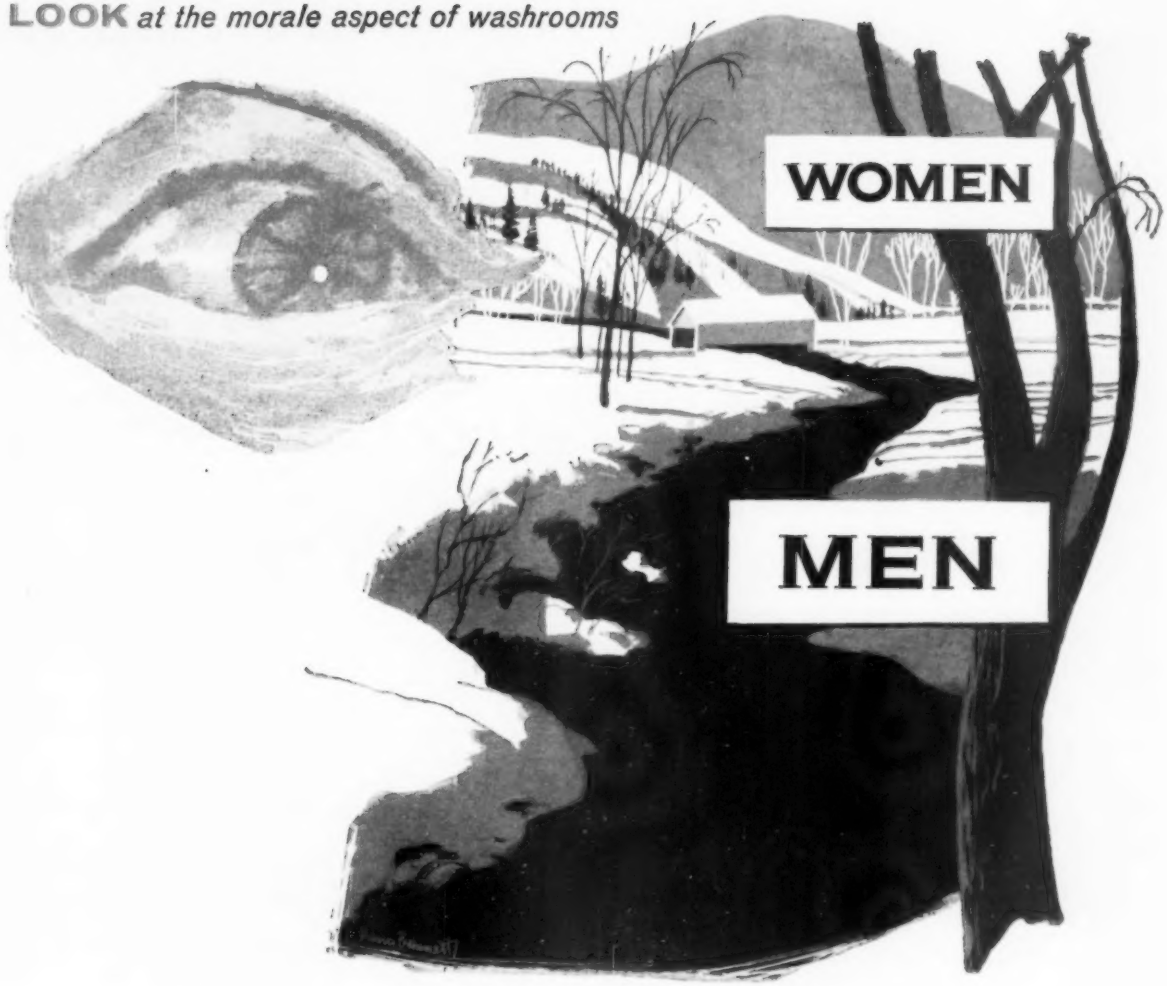

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HOW NEW MATERIALS HIT

Begins on page 228

a stage. Today's model is a descendant of that demonstration. Since then, manufacturing engineers have been deeply involved in the project. Right now a manufacturing engineer and a product engineer are married to the production operation. They're solving problems jointly. It's the only way some of the complex problems can be worked out.

Take the polyurethane solution, for example (big photo, page 229). When the box is folded, the folds must be filled and glued. After dozens of tries, engineering came up with the idea of pouring polyurethane into the cracks. It expands, makes a positive seal, is a good glue. But nobody knew how to work with the stuff in this application. Manufacturing engineering came up with a time device that measures flow into the cavities. A plastic corner seal was developed. Result: an all-new and successful method.

10. DIFFERENT PLANT

"If we were building a new plant," says Ritter, "we'd be influenced by this change." Floor loads will be lighter. No more heavy stamping and welding. No more painting. Space needs will be higher, even without painting.

On the other side of the ledger: The plant could do its own anodizing. The Columbus plant was new in 1954. It was built to house a manufacturing process. But what's happening there today challenges the conventional idea of building a shell around a process. It's a case to support the plant engineers and architects who argue that flexibility should always receive top consideration in designing a plant.

WHEN CHANGE HITS YOU

The Westinghouse-Columbus story is a story of change. And if you're not in the midst of change right now, you'll surely have to live with it in the future.

Any way you can prepare for change? Best and only way: Keep abreast, keep informed, and meet change with the enthusiasm Westinghouse managers show for their new product. **END**

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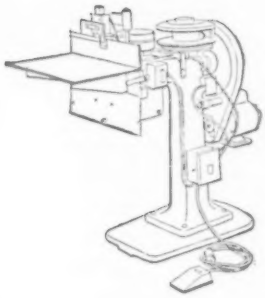

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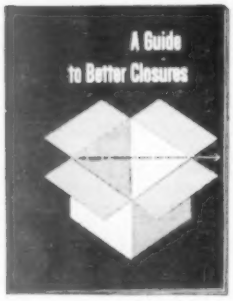

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357—Centrifugal Roof Ventilator. Bulletin 550 gives complete mechanical data and features. Clarage Fan Co.

358—Washfountains. Bulletin K-1204 gives full information on duo-washfountains. Bradley Washfountain Co.

359—Fans. Bulletins FI-110, FI-511, give info on four types for unusual applications. Buffalo Forge Co.

360—Compressors. Descriptive literature on rotary compressors for plant air supply. Allis-Chalmers Mfg. Co.

361—Steam Cleaning. Complete data on all-electric cleaner and coating machine. Homestead Valve Mfg. Co.

362—Lighting. Free brochure defines and explains advantages of Eye-Fi Relighting. National Lighting Bureau.

363—Vacuum Cleaning Systems. Information on installed systems for varied applications. Spencer Turbine Co.

364—Dust Filters. New bulletin (No. 105) and 36-page Dust Control Catalog 104 on request. W. W. Sly Mfg. Co.

365—Pumps. Bulletin 5440A on new non-clogging pumps for handling solids in suspension. Fairbanks-Morse Co.

366—Corrosion Inhibitor. Bulletin 410-12-3 describes uses of CS corrosion inhibiting chemical. Hagan Chemicals.

367—Steam Generator. Bulletins SG-200 and JC-100 on new plug-in steam generators. Pantex Mfg. Corp.

368—Unit Heaters. Free copy of booklet, "Modern Heating," gives full facts and features. Reznor Mfg. Co.

MAINTENANCE

369—Lubricants. Booklet, "Management Practices That Control Costs via Organized Lubrication." Texas Co.

370—Engineered Maintenance. Booklet details organized plant sanitary maintenance service. Puritan Chemical Co.

371—Lubricants. Illustrated bulletin describes features of new and improved multi-purpose oil. Gulf Oil Corp.

372—Power Sweeper. New brochure on newest addition to nation's best-known line. Clarke Floor Machine Co.

373—Paints. Free folder on fire retardent paint describes new kind of paint. E. I. du Pont de Nemours & Co.

ELECTRICAL

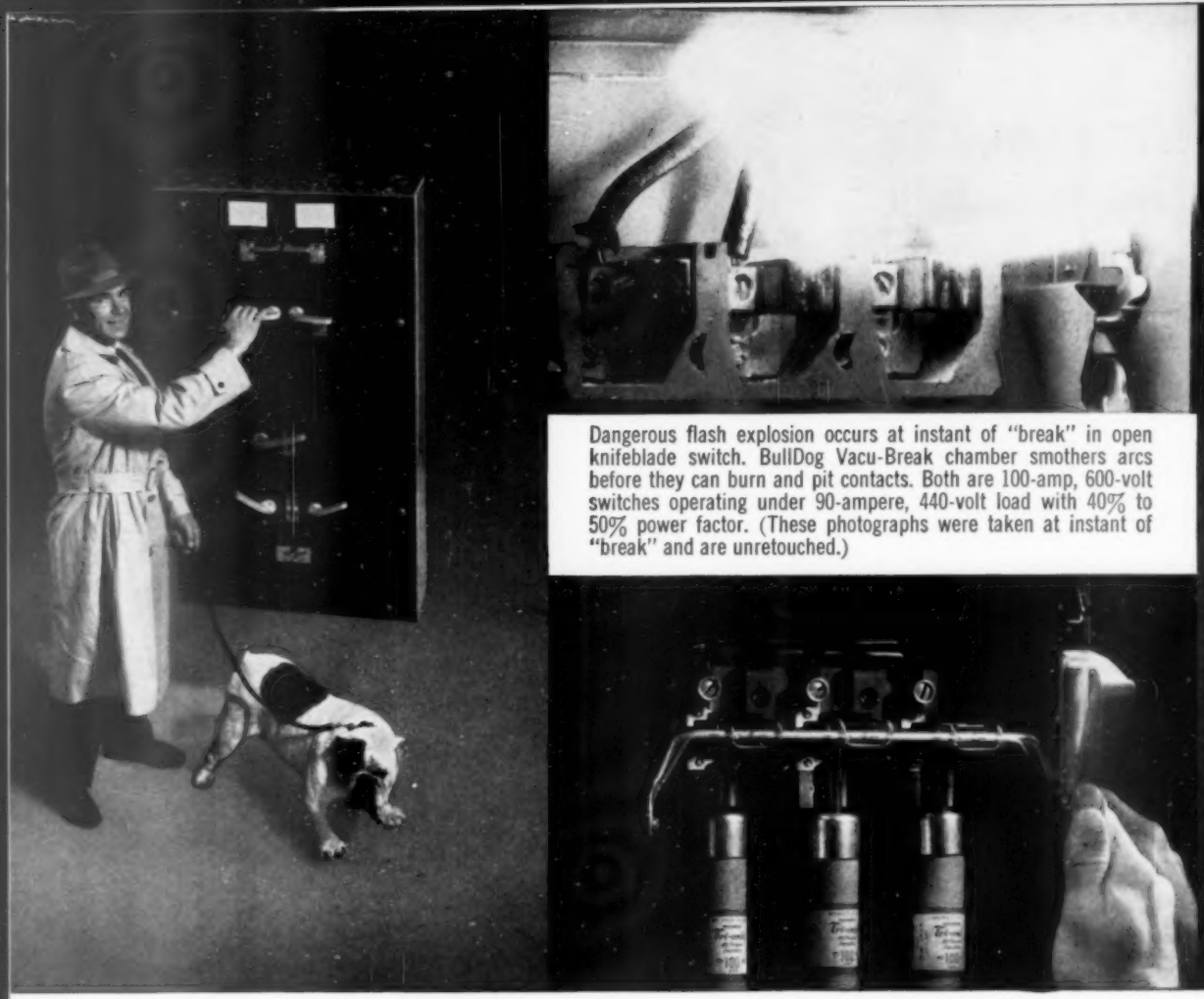
374—Limit Switches. Catalog 84 gives full description of "ML" and other heavy-duty types. Micro Switch Div.

375—Switchboards. Bulletin 3-310 gives details for low-cost power distribution. Federal Pacific Electric Co.

376—Fuses. Bulletins FIS and HCS describe dual-element and high-capacity types. Bussmann Mfg. Co.

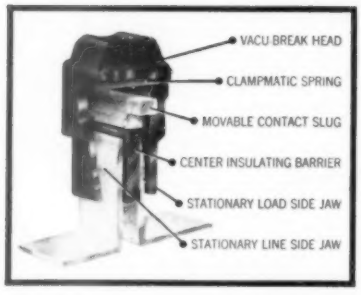
377—Silicones. Booklet details features of electrical equipment insulated with silicones. Dow Corning Corp.

Turn the page



Dangerous flash explosion occurs at instant of "break" in open knifeblade switch. BullDog Vacu-Break chamber smothers arcs before they can burn and pit contacts. Both are 100-amp, 600-volt switches operating under 90-ampere, 440-volt load with 40% to 50% power factor. (These photographs were taken at instant of "break" and are unretouched.)

FOR SAFETY'S SAKE
BUY VACU-BREAK POWER PANELS



Close-up of Vacu-Break head shows movable contact slug inside the compact arc chamber. The Clampmatic spring assembly assures a bolt-tight contact, helps speed "break". This combination guarantees positive and safe operation, long switch life.

You switch with safety when you choose BullDog Power Panels with Vacu-Break* switch units! Exclusive Vacu-Break design houses contacts in compact arc chambers that limit the oxygen supply . . . actually starve the arc before it can explode and pit or burn contacts. Maintenance is practically eliminated.

Contacts in the Vacu-Break unit are attached directly to the operating handle for positive, safe switching every time. When the handle is in the OFF position—you know the switch is *off!* For extra safety the units have interlocking doors. The Vacu-Break unit also provides clamped-pressure switching contacts to prevent overheating. Clampmatic* design simulates a *bolted connection* when in the ON position . . . accelerates the break, too!

In recent tests, Standard BullDog switches with Amp-Traps** were subjected to 100,000-amp short circuit current. They were undamaged! You can get this extra safety and long-lasting performance by specifying BullDog Vacu-Break Power Panels.

© BEPCO

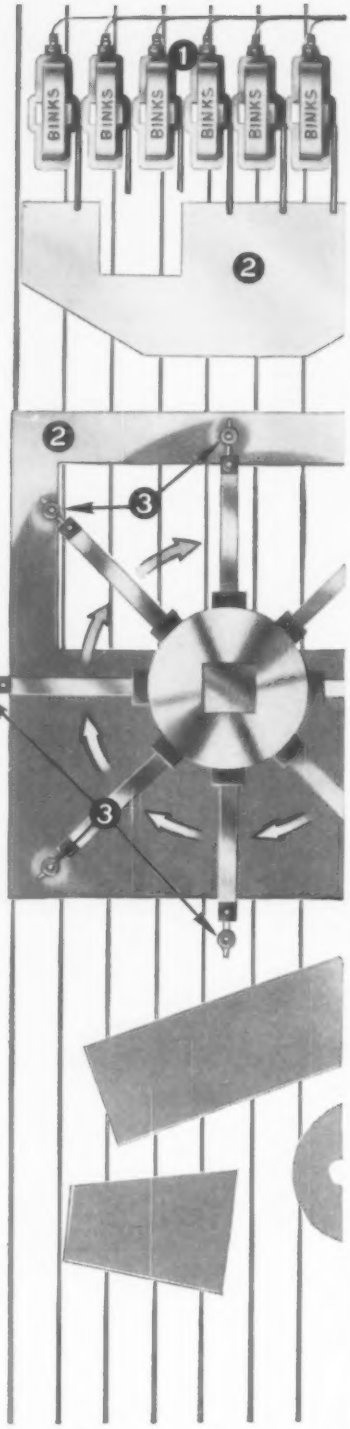
BULLDOG

BullDog Electric Products Company, Division of I-T-E Circuit Breaker Company, Detroit 32, Mich. *BullDog Export Division:* 13 East 40th St., New York 16, N.Y. *In Canada:* BullDog Electric Products Co. (Canada) Ltd., 80 Clayson Rd., Toronto 15, Ont.

**Vacu-Break and Clampmatic are registered trademarks of the BullDog Electric Products Company. **Amp-Trap is a registered trademark of the Chase-Shawmut Company.*

For more facts Circle 598 on Reader Service Card

Now you can automatically SPRAY non-repetitive, odd shapes without wasting material...



Binks MEMORY TIMERS automatically sense product shape, size and location on the conveyor and relay these data to your automatic spray guns. Spray guns operate only when each product is in precise position. No material is wasted spraying cutout areas or odd shapes. Coverage uniformity is improved.

These electro-mechanical timers are rugged and dependable . . . adaptable to most rotary, horizontal or vertical spraying machines.

Here is how the system looks from above

① *Binks MEMORY TIMERS astride your conveyor sense size, outline and location of...*
② *irregularly-shaped products to be sprayed and relay this information to . . .*
③ *your automatically operated spray guns.*

Send for Bulletin A96-1 See how this new timer completely automates your finishing operation without involving you in complex equipment. Call your nearest Binks Branch Office or write direct.

9086

Binks
EVERYTHING FOR SPRAY PAINTING

SPRAY GUNS

AIR COMPRESSORS

NATIONWIDE SERVICE

Binks Manufacturing Company
3114-34 West Carroll Avenue, Chicago 12, Illinois

REPRESENTATIVES IN PRINCIPAL U.S. & CANADIAN CITIES • SEE YOUR CLASSIFIED DIRECTORY

ADVERTISERS' LITERATURE

Begins on page 236

Offered in ads received up to 5th of last month. To get items you want, circle numbers on Reader Service Card next to back cover.

378—Welder Controls. Bulletin SM-277 describes various features of new plug-in controls. Square D Co.

379—Motor Controls. Catalog 5800 gives complete information and mechanical features. Furnas Electric Co.

380—Rectifiers. Available: free guide to selection of metallic rectifier equipment. Sel-Rex Corp.

381—Maintenance Service. Bulletin GED-3465, "Ten Service Benefits," on repair service. General Electric Co.

MATERIALS HANDLING

382—Truck Tires. Free copy of industrial tire and wheel booklet and tire analysis plan. B. F. Goodrich Co.

383—Fork Lift Trucks. Booklet SP-23 gives complete information about new lift truck. Towmotor Corp.

384—Scales. Detailed booklet describes weightograph for attaching to any beam scale. Howe Scale Co.

385—Tramrails. Free booklet 2008 covers data and construction features. Cleveland Crane & Engineering Co.

386—Monorails, Cranes. Bulletin KS-1 describes shielded electrification protection. American Monorail Co.

387—Pallets. Bulletin gives descriptive information on precision-made "Bolt Down" pallets. Republic Steel Corp.

388—Sectional Bar Racks. Detailed information for improved handling and storage. Republic Steel Corp.

389—Stitchers. Bulletin AD-152 gives complete information on box, book, and metal stitchers. Acme Steel Co.

390—Casters, Wheels. Catalog contains complete specifications and details on full line. The Fairbanks Co.

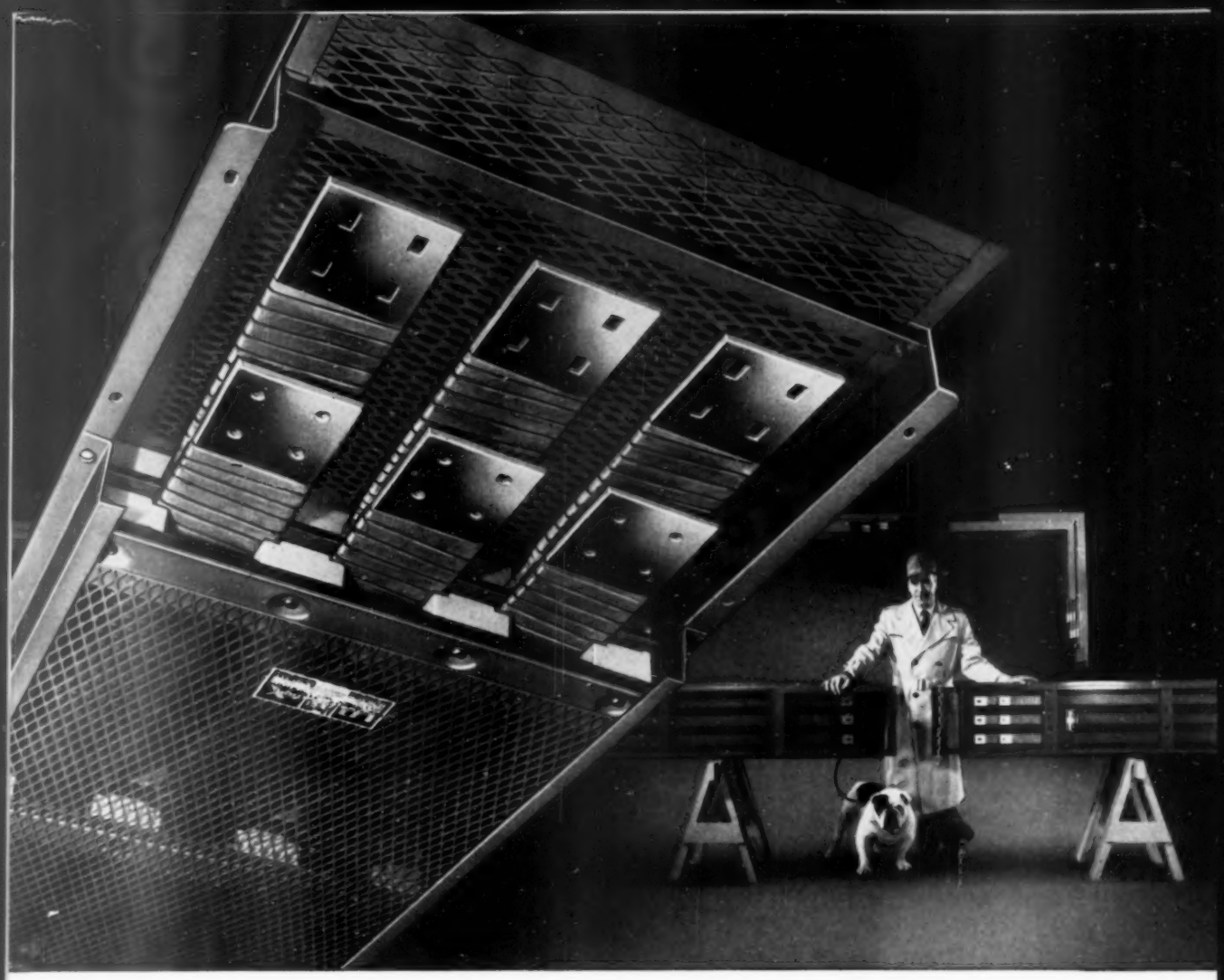
391—Hoists. Catalog lists features and capacities of new model electric hoists. Chisholm-Moore Hoist Div.

PRODUCTION

392—Data Processing. Illustrated Brochure F-2 gives full information on the system. Royal McBee Corp.

393—Heat Transfers. Bulletin P-60 gives complete data on new multi-zone unit. Tranter Manufacturing, Inc.

Turn the page



"PAIRED PHASING" HELPS YOU MEET THE LOAD...WITH POWER TO SPARE

Lo-X Bus Duct assures lower balanced voltage drop . . . extra current carrying capacity

Increase your safety margin against unexpected power fluctuations! BullDog BUStribution®—using a paired phased arrangement of aluminum bus bars—neutralizes magnetic fields, assures uniform balanced current distribution and low voltage drop. Exclusive "paired phasing" acts to distribute current equally throughout the cross-sectional area of each conductor . . . balances current among all conductors . . . reduces impedance to a minimum. Full use of the conductor material assures extra capacity, allowing your LO-X feeder system to operate at top efficiency.

And LO-X offers these additional operating advantages. The duct has no moving parts . . . thus nothing to wear. It is prefabricated . . . adapts to any building contour. Exclusive scarf-lap joints assure rigid connections . . . speedy installation. BullDog's five-step silvering process of aluminum bus bars guarantees maximum conductivity at connection points. Special spring-type cup washers at the joints give a positive *bolted* connection.

For a distribution system that guarantees top performance and long, continuous service settle on *Bus Duct by BullDog* . . . it will readily adapt to your changing power needs.

BULLDOG ELECTRIC PRODUCTS DIVISION
I-T-E CIRCUIT BREAKER COMPANY
BOX 177 • DETROIT 32, MICHIGAN

In Canada: 80 Clayson Rd., Toronto 15, Ont. Export Division: 13 East 40th St., New York 16, N.Y.

For more facts Circle 600 on Reader Service Card

VERSATILE, NEW PLUG-IN STEAM GENERATOR

Series "R" SPEEDYLECTRIC generates steam to 250 psig. and temperatures to 405°F. Write today for Bulletin SG-200. Larger capacity Steam-Jet Cleaners available. Write for Bulletin JC-100.

Easily Converted to a Steam-Jet Cleaner!

For plug-in operation on 110- and 220-volt circuits, the precision-built, compact, ASME Code Series "R" SPEEDYLECTRIC steam generator is ideal for laboratory, pilot plant and even production processes requiring small volumes of high-pressure steam!

This midget-size SPEEDYLECTRIC, like all SPEEDYLECTRIC models, features safe, simple, electrode heating with precise current control. Easily converted to a Steam-Jet Cleaner for sterilizing and de-icing, by means of an accessory kit.

See our catalog in Sweet's "Plant Engineering" File.

Pantex **MANUFACTURING CORPORATION**

P.O. Box 660AW **Pawtucket 3, Rhode Island**

6-381

For more facts Circle 601 on Reader Service Card

EFFICIENT

Sel-Rex®

CUSTOM ENGINEERED RECTIFICATION

- *Germanium*
- *Silicon*
- *Selenium*

Semiconductor elements, controls, cooling systems — every component used in Sel-Rex Rectifiers is determined by the specific application. Similarly rated units, in slightly dissimilar applications, often have components from several different "name-brand" sources. "Custom-Engineering" like this guarantees you the most efficiently operating rectification it is possible to build.

Send for FREE "GUIDE" to Industrial Rectifier Equipment.

Rectifier Division

SEL-REX CORPORATION

NUTLEY 10, NEW JERSEY Representatives in Principal Cities

"Complete Semiconductor Power Conversion Systems for any AC to DC application."

ADVERTISERS' LITERATURE

Begins on page 236

Offered in ads received up to 5th of last month. To get items you want, circle numbers on Reader Service Card next to back cover.

394—Pillow Blocks. Bulletin 1058 gives facts and mechanical features of one-piece unit. Stephens-Adamson Mfg. Co.

395—Metal Cutters. Free catalog lists over 100 various sizes and types, hand- or power-operated. H. K. Porter, Inc.

396—Gears, Speed Reducers. Catalogs 55 and 57 for data helpful in selecting all types. Horsburgh & Scott Co.

397—Mounting Pads. Complete facts on applications and low-cost installation. Unisorb Div., Felters Co.

398—Centralized Timekeeping Systems. Information for production, cost, incentive plan controls. Executone, Ltd.

399—Power Tools. New catalog lists world's most complete line of power tools. Delta Div., Rockwell Mfg. Co.

400—Shears. Catalog 2011 gives construction and engineering details. Cleveland Crane & Engineering Co.

401—Spray Guns. Bulletin A96-1 describes new timer for automating finishing operations. Binks Mfg. Co.

402—Cemented Carbide Tools. Catalog C-16 contains prices, complete specifications. Allegheny Ludlum Steel Corp.

403—Photo Panels. Information and literature on photo panels available on request. Acme Visible Records, Inc.

404—Industrial Wipers. Write for this 24-page illustrated booklet, "Industrial Wiping." Scott Paper Co.

405—Screwdriving Bits. Catalog 30-C shows right type for specific applications. Apex Machine & Tool Co.

406—Finishing Systems. Catalog A-659 describes systems for dip coating, spray painting. R. C. Mahon Co.

407—Tool Catalog. 156-page hand-tool buying guide for all types of wrenches and hand tools. Snap-On Tools Corp.

408—Speed Reducers. Folder 2724 lists complete line and data on new worm gear speed reducers. Link-Belt Co.

409—Graphic Instruments. Literature on portable or panel mounting model strip chart recorder. Rust Industrial Co.

410—Schedule Board. Bulletin X-400 shows applications of visual control board. Graphic Systems, Inc.

Turn the page

For more facts Circle 602 on Reader Service Card

119 Eyes, $615,468* Saved

in 5 Years at Pullman-Standard

...another answer to

"Does Eye Protection Pay Off?"

At plants of leading car builder, Pullman-Standard Manufacturing Company, wearing of eye protection is a "must". It pays — in eyes saved, pain saved, skills saved and dollars saved. Eye protection equipment is furnished free to all employees, including those needing prescription glasses. (All visitors are furnished Safety Glasses or Plastic Cover Shields for wear over personal glasses.) RESULT: IN 5 YEARS OVER 67½ MILLION MAN-HOURS WORKED WITHOUT A LOST EYE.

Quality eye protection equipment such as manufactured by American Optical Company featuring *safety standard* frames and lenses is a vital ingredient in achieving performance like this. And it can pay for itself in less than 6 months' time. Call your nearest AO Safety Representative or write us at Southbridge, Mass.

*Based on average award of $5,172 for each lost eye for Workmen's Compensation alone in the several states in which Pullman-Standard operates plants.

JOHN MIMS

Splatter of hot solder cracked his left bifocal *heat treated* safety lens. Result: Lens took punishment, eye saved.

ERNEST DEMES

Hot tar splattered lens; burned cheek, eyebrow, forehead. Result: Eye saved.

BRUCE REED

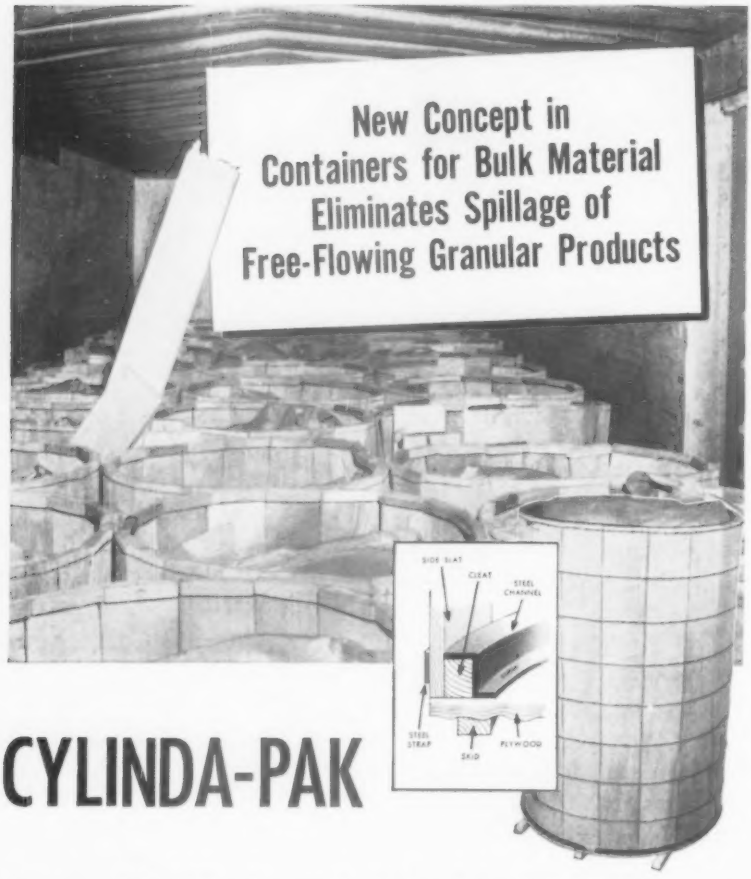
Piece of broken drill struck left lens of safety goggles, continued up to roof of building "singing like a bullet". Result: Eye saved.

Always insist on the ® Trademark on lenses and frames

American Optical
COMPANY
SAFETY PRODUCTS DIVISION

SOUTHBRIDGE, MASSACHUSETTS
Branches in Principal Cities

For more facts Circle 603 on Reader Service Card



CYLINDA-PAK

Generalift Wirebound Cylindrical Pallet Boxes Cut Handling and Shipping Costs with Safety

Cylinda-Pak Generalift wirebound pallet boxes bring a new concept in containers for bulk handling. Strong and resilient design prevents puncture or breakage that causes spillage and allows extra high stacking without bulging. They are light in weight and have an exceptional ratio of tare weight to contents.

The carload of Cylinda-Pak Generalifts in the photo above proved they could take rough treatment and still deliver their product safely with *no spillage*. These Cylinda-Paks contained approximately 1400 lbs. each of granular material and were shipped more than 1800 miles to the East Coast. En route this car and others received such rough treatment that 2" x 8" bulkheads were shattered—some of the bulkheading is shown protruding among the containers in the center of the car—yet none of the granular material was lost.

Cylinda-Paks have sides of tough hardwood, bound by galvanized steel wires. The base of rigid plywood is mounted on hardwood skids and equipped with a special steel channel, shown above. Inside cleats at the bottom of the wirebound vertical side sections are held in the channel by a tensioned steel strap. Write for details.

General Box

ENGINEERED CONTAINERS FOR EVERY SHIPPING NEED
Wirebound Crates and Boxes • Generalift Pallet Boxes • Stitched Panel Crates • All-Bound Boxes • Corrugated Containers

FACTORIES: Denville, N. J. • East St. Louis • Detroit • Kansas City • Louisville • Milwaukee • Nashville • Sheboygan • Winchendon, Mass. • Meridian, Miss. • Continental Box Co., Inc., Houston

541

GENERAL BOX COMPANY
1807 MINER STREET • DES PLAINES, ILLINOIS

For more facts Circle 604 on Reader Service Card

ADVERTISERS' LITERATURE

Begins on page 236

Offered in ads received up to 5th of last month. To get items you want, circle numbers on Reader Service Card next to back cover.

411—Cylinders. Bulletin SQ 10-58 lists design range of air and hydraulic cylinders. Tomkins-Johnson Co.

412—Time Recorders. Folder lists line of mechanical and electrical models and applications. Service Recorder Co.

MISCELLANEOUS

413—Dock Shelters. Facts about dock shelters. They're retractable when not in use. Dazzo Products, Inc.

414—Paints. Test Chip and Color Chart on 27 enamel colors for equipment. American-Marietta, Valdura Div.

Are You Missing Out On the Top Ideas?

Not if you're cashing in on the values in FACTORY reprints. In 1958 readers bought over 200,000 copies. Used them to stimulate ideas in executive and supervisory meetings, get new cost-cutting tips, train foremen and workers, find answers to problems in production, maintenance, industrial management.

Total sales of the 10 best-selling reprints of 1958: 26,000. If they're useful to so many other plant management men, maybe you, too, ought to take a look at them. For copies, write to FACTORY Reader Service, 330 W. 42nd St., New York 36.

Code	Title
A155	Work Simplification (50¢)
A153	Tips to Successful Discipline (50¢)
A 74	Work Sampling (50¢)
A141	50 Tips to Better Leadership (35¢)
A127	Plant Site Selection Guide (35¢)
A106	Preventive Maintenance (50¢)
A130	12 Hazards in Organization (35¢)
A156	Tips to Better Delegating (35¢)
A123	New Approach to Quality Control (50¢)
A163	Maintenance Management Practices Today (50¢) (Survey of 359 plants)

Prices for single copies (up to 100) are noted on the list. Bulk prices are as follows:

Copies	35¢ Reprints	50¢ Reprints
100-299	25¢ each	35¢ each
300-499	20¢ each	25¢ each
500 or more	15¢ each	20¢ each

A step up in safety...

BLAW-KNOX Electroforged® Steel Grating and Treads

Indoors or outdoors the safe way to build a walkway is with Blaw-Knox Electroforged steel grating. Nonslip twisted crossbar provides the safest possible surface. Self-cleaning, steel grating does not collect dirt or grease . . . provides maximum open area for light and ventilation.

Designed for flexibility, one-piece construction installs easily around beams, piping, machinery or other installations. Needs no maintenance . . . nothing to wear. All surfaces accessible for easy painting.

For more detailed information about how to order Blaw-Knox Electroforged steel grating and treads for your needs, send for your copy of Blaw-Knox Bulletin number 2527.

BLAW-KNOX

BLAW-KNOX COMPANY
Equipment Division
Dept. B, Pittsburgh 38, Pennsylvania

For more facts Circle 605 on Reader Service Card

Multi-Million Dollar Plant of American Greetings Corporation

goes modern with
3000 DIAMOND I FIXTURES BY SYLVANIA

When American Greetings Corporation built the world's largest single-floor greeting card manufacturing plant in suburban Cleveland, they placed special emphasis on their lighting requirements. For they had found from past experience that faulty lighting often led directly to production inefficiencies and shipping errors.

SYLVANIA'S DIAMOND I SERIES . . .

An ideal fixture to use where critical seeing tasks call for high quality illumination. Meeting or exceeding all RLM requirements for 20%-30% upward component fixtures, the Diamond I Series offers exceptional efficiency with outstanding installation and maintenance features.

The Diamond I Series is now available for use with high output and very high output lamps in addition to conventional Rapid Start and Instant Start models. Write for complete information.

On choosing Sylvania's Diamond I fixtures to light this smooth-running plant, Chief Industrial Engineer Henry Bernbaum states, "We set rigid lighting specifications and the Sylvania fixtures met all of them from every angle. We now have the quality lighting system we need and we obtained it at a reasonable cost."

The next time *you* face a lighting problem in a new plant or old, look first to Sylvania. The wide variety of industrial fixture types offered by Sylvania allows you to choose the particular fixture that suits your application best. No matter which type you pick you'll know you're getting quality fixtures at a reasonable price.

For *all* of your industrial and commercial lighting needs . . . Go Modern with Lighting by SYLVANIA.

SYLVANIA LIGHTING PRODUCTS
A Division of SYLVANIA ELECTRIC PRODUCTS INC.
Department 59-2
One 48th Street, Wheeling, West Virginia

GO MODERN WITH LIGHTING BY **SYLVANIA**

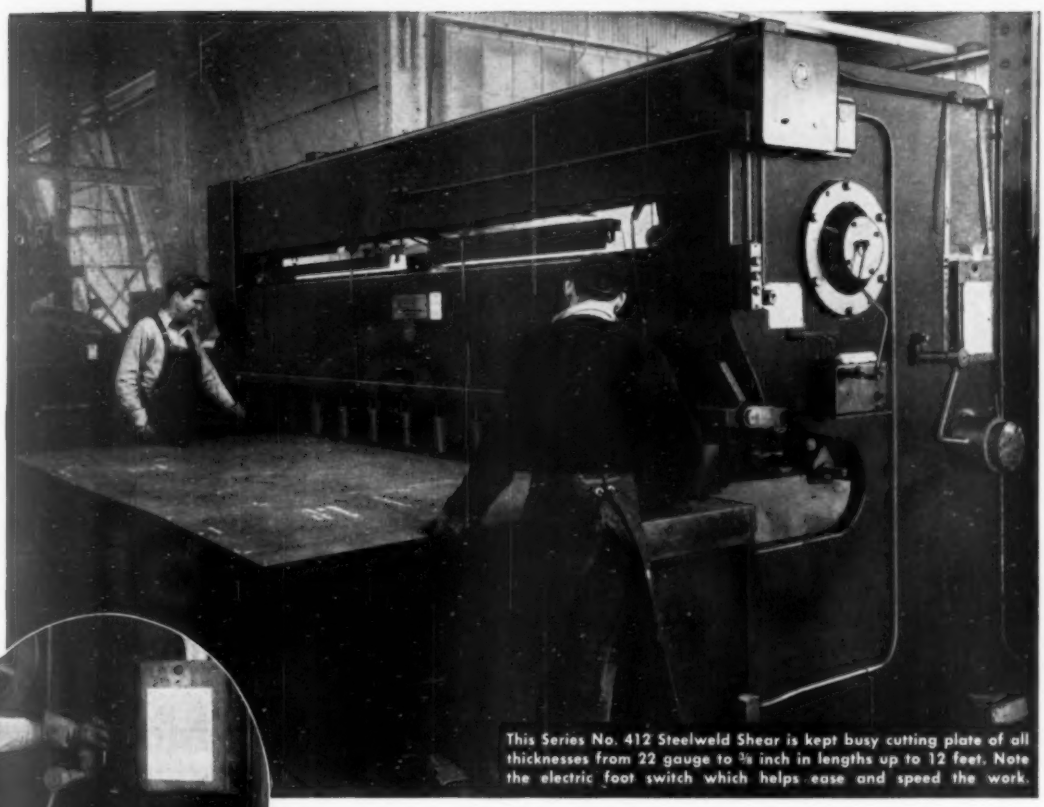
Fluorescent Lighting Fixtures and Systems

BEST FIXTURE VALUE IN EVERY PRICE RANGE

LIGHTING • TELEVISION • RADIO • ELECTRONICS • PHOTOGRAPHY • ATOMIC ENERGY • CHEMISTRY-METALLURGY

For more facts Circle 606 on Reader Service Card

KNIVES STAY SHARP LONGER for California Steelweld Shear User



This Series No. 412 Steelweld Shear is kept busy cutting plate of all thicknesses from 22 gauge to ⅜ inch in lengths up to 12 feet. Note the electric foot switch which helps ease and speed the work.

One of the big reasons why knives stay sharp longer on Steelweld Shears is the simplicity with which knife clearance can be adjusted for every plate thickness. It's merely a matter of turning a hand crank until the gauge pointer is on the proper figure. No bolts to loosen. No need of a feeler gauge.

"It's a shame," said the shop foreman at Stephens-Adamson Mfg. Co., Los Angeles, California, "but since installing our Steelweld Shear the knife-sharpening man has been crying because we have no work for him."

After months of continuous operation, eight hours a day, usually six days a week, inspection of cut pieces indicates the knives are practically as sharp as new. Parts cut have no burrs and are straight and true. Even when the cutting edges of the knives finally become dulled, there are three more cutting edges ready for use as all four corners of each knife are prepared for shearing.

Stephens-Adamson like their Steelweld Shear and are happy over its operation. It plays an important role in the manufacture of screens, elevators and conveyors which are the principal products of this large West-coast plant. In their words, it is "heavy, well built and dependable. We know it is reliable and always ready to handle our work from day to day."

GET THIS BOOK!

CATALOG No. 2011 gives construction and engineering details. Profusely illustrated.

THE CLEVELAND CRANE & ENGINEERING CO.

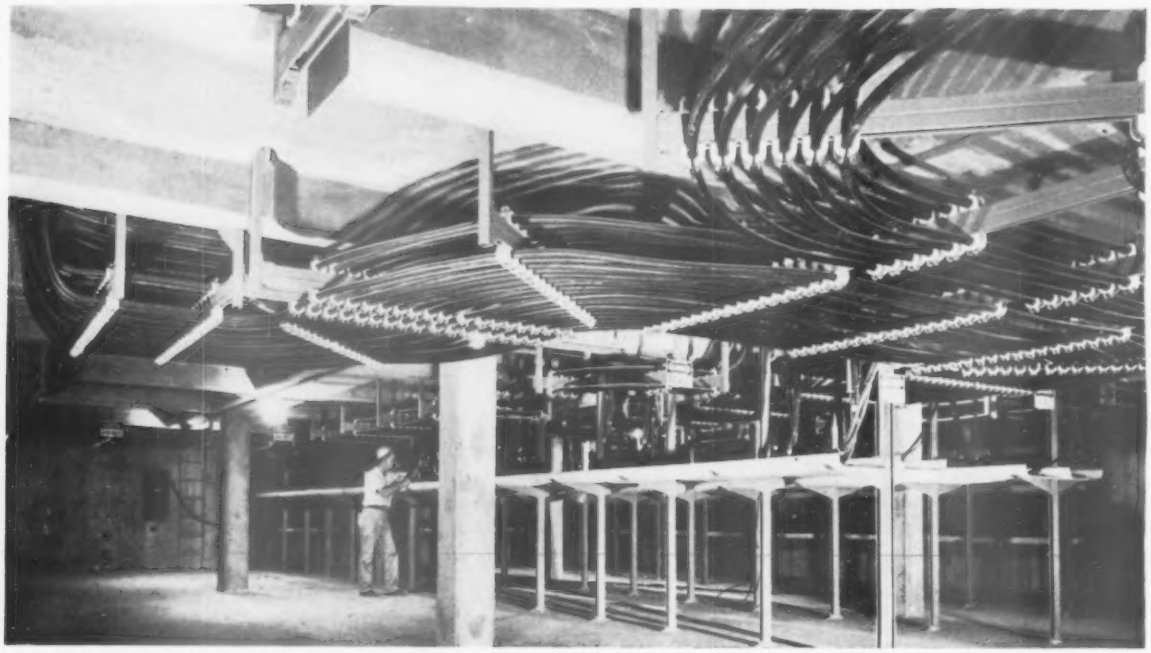
3217 EAST 282 STREET, WICKLIFFE, OHIO

STEELWELD PIVOTED BLADE SHEARS

For more facts Circle 607 on Reader Service Card

New National Potash Company plant, near Carlsbad, N. M., covers 10 acre produces up to 800 tons of potash concentrate daily.
General Contractor: Stearns-Roger Manufacturing Co., Denver, Colorado.
Electrical Distributor: Fairmont Supply Co., Fairmont, West Virginia.
Electrical Contractor: Service Electric Co., Carlsbad, N. M.

More Than 70 Miles of Cable in This New Plant



Banks of 480-volt feeder cable converge under ceiling in No. 2 substation basement of new National Potash Company plant. Like all the cable used in this installation, it's Roebling and made to withstand the tough corrosive conditions.

And It's All Roebling Because...

We're in Carlsbad, New Mexico, at National Potash Company's new $12,000,000 refinery. More than 375,000 feet of cable were installed in this plant by Service Electric Company, Carlsbad, New Mexico, the contractor. And all of it is Roebling!

Let Mr. Harvey Mathews, vice president of Stearns-Roger tell you some of the reasons why: "Cable specifications required an insulation that was tough and durable, because here, as in all plants of this type, there is the ever-present factor of corrosion caused by atmospheric moisture being absorbed into the salt dust, forming brine, as well as the corrosive action of the chemicals present. Obviously," continues Mr. Mathews, "we had to have wire and cable insulation of superior quality throughout, to protect the plant's electrical system from insidious failure."

Every Roebling cable and wire is built to last—and last some more—even under the severe conditions prevailing in applications like this potash refinery! Roebling never takes short cuts. Each Roebling wire and cable is made with scrupulous care to assume maximum life and service. And this *extra* pride of workmanship means no premium in price. What's more, Roebling Technical Service—based on generations of practical experience—is always freely available to help you get the *most* from the Roebling products you use.

Harvey Mathews, vice president, Stearns-Roger Manufacturing Company, discusses building plans with Jack Lorenz, resident engineer.

Next time—take the headaches out of the job by specifying *Roebling* all the way! For Roebling *extra-quality* wire and cable see your Roebling Distributor or write: Electrical Wire Division, John A. Roebling's Sons Corporation, Trenton 2, New Jersey.

ROEBLING

Branch Offices in Principal Cities
Subsidiary of The Colorado Fuel and Iron Corporation

For more facts Circle 608 on Reader Service Card

TURN TO TYPHOON FOR AIR CONDITIONING THAT PAYS FOR ITSELF ON THE TYPHOON LEASE PLAN

Save working capital! Typhoon offers an advantageous new lease plan that enable you to pay for your air conditioning out of increased earnings brought about by the air conditioning itself. Or, you can take advantage of the Typhoon installment plan, which supplies the equipment you need on a basis geared to depreciation. Statistics have proven that an increase of 2% in employee efficiency will pay full costs of owning and operating a Typhoon system. Records show increases of 24% in steno pools, 51% in drafting rooms, 35% for white collar workers, 22 to 28% in general factory work. Adds up to a convincing story for air conditioning, doesn't it? For over half a century, Typhoon has been installing versatile custombuilt units at mass production prices. Typhoon can supply units for roof, wall, basement, ceiling, or outdoor installation... anywhere and everywhere convenient for you. From giant plants to delicate research labs, Typhoon can pinpoint the exact temperature and humidity you need for maximum production efficiency. Fill out the coupon below and learn how you can prove to yourself that industrial air conditioning more than pays for itself.

TYPHOON
DIVISION OF HUPP CORPORATION

Typhoon Air Conditioning Company, Division of Hupp Corporation
505 Carroll Street, Brooklyn 15, New York

☐ Have a representative call me for an appointment.
☐ Please send folder on air conditioning industrial plants.

Name_____

Title_____

Firm_____

Address_____

9C-11

low maintenance cost

It costs you next to nothing to maintain your heating system when you have Reznor gas heaters. A few minutes per heater once a year for motor lubrication should be your total maintenance time. And no skilled labor is required. Heater failures? Simple, fool-proof design and quality construction make them a rarity.

LOW MAINTENANCE COST is just one of many reasons why Reznor gas unit heaters are right for so many plant heating jobs. Whether you need one heater to eliminate a "trouble" spot or enough units for a complete plant heating system, ask your Reznor distributor for details or write for your free copy of "Modern Heating".

Look for Reznor under "Heaters-Unit" in the Yellow Pages

REZNOR
WORLD'S LARGEST SELLING DIRECT-FIRED
UNIT HEATERS

Reznor Manufacturing Company, 89 Union Street, Mercer, Pa.

For more facts Circle 610 on Reader Service Card

ANOTHER *PANNIER* MASTER MARKER!

New Roto-Pin type lock is integral part of *all* Pannier Supreme Holders . . . eliminates loose, bent, dropped, or lost pins . . . flip it open to change type . . . flip it back to securely lock type in clear-marking position.

PANNIER'S
SUPREME HOLDER
WITH ROTO-PIN LOCK

Safe, fast type changing. Holder in variety of styles.
Machined from High-Grade Bar Tool Steel.
Hardened anvil maintains type alignment.
Striking Head of Tool Steel . . . Replaceable to add long service life to Holder.

Write for complete data.

BIRTHMARKED MATERIALS

MARKING MASTER PANNIER MARKERS DEVICES
THE PANNIER CORPORATION
201 Pannier Building • FAirfax 1-5185 • Pittsburgh 12, Pa.
Offices: Los Angeles • Chicago • Cleveland • Philadelphia • Birmingham

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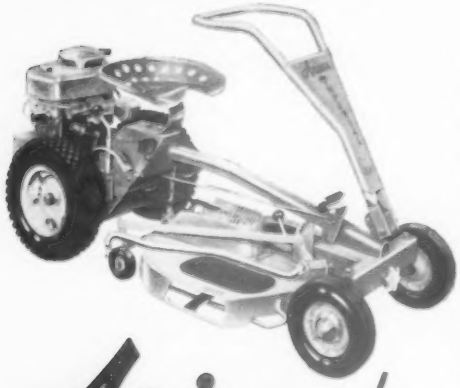
For tough mowing---

choose the dependable 4½ h.p.

Ariens Imperial
RIDING MOWER



No other riding mower on the market equals the Ariens IMPERIAL for easy, fingertip operation . . . power to climb grades up to 50% . . . rugged construction that assures long, dependable service! Its 26-inch "Flex-N-Float" rotary mower flexes and floats in every direction to follow every ground contour without scalping . . . trims lawns velvety smooth . . . cuts tough weeds . . . climbs uphill, downhill, quartering with full stability . . . has 22" inside turning radius.

Powered by 4½ h.p. Clinton or Lauson engine, with optional 12-volt electric starting; speeds of 2, 3, 4, 5 m.p.h. forward and 2 m.p.h. reverse. Interchangeable Insta-Hitch attachments: 30" reel mower and bulldozer blade. Field tested in 36 states on every type of tough mowing job — cemeteries . . . industrial plants and school grounds . . . parks . . . golf courses . . . toll road parkways . . . estates . . . residential lawns — Ariens IMPERIAL outperformed all other riding mowers. Write for full information today!

Ariens COMPANY · 227 CALUMET ST., BRILLION, WIS.

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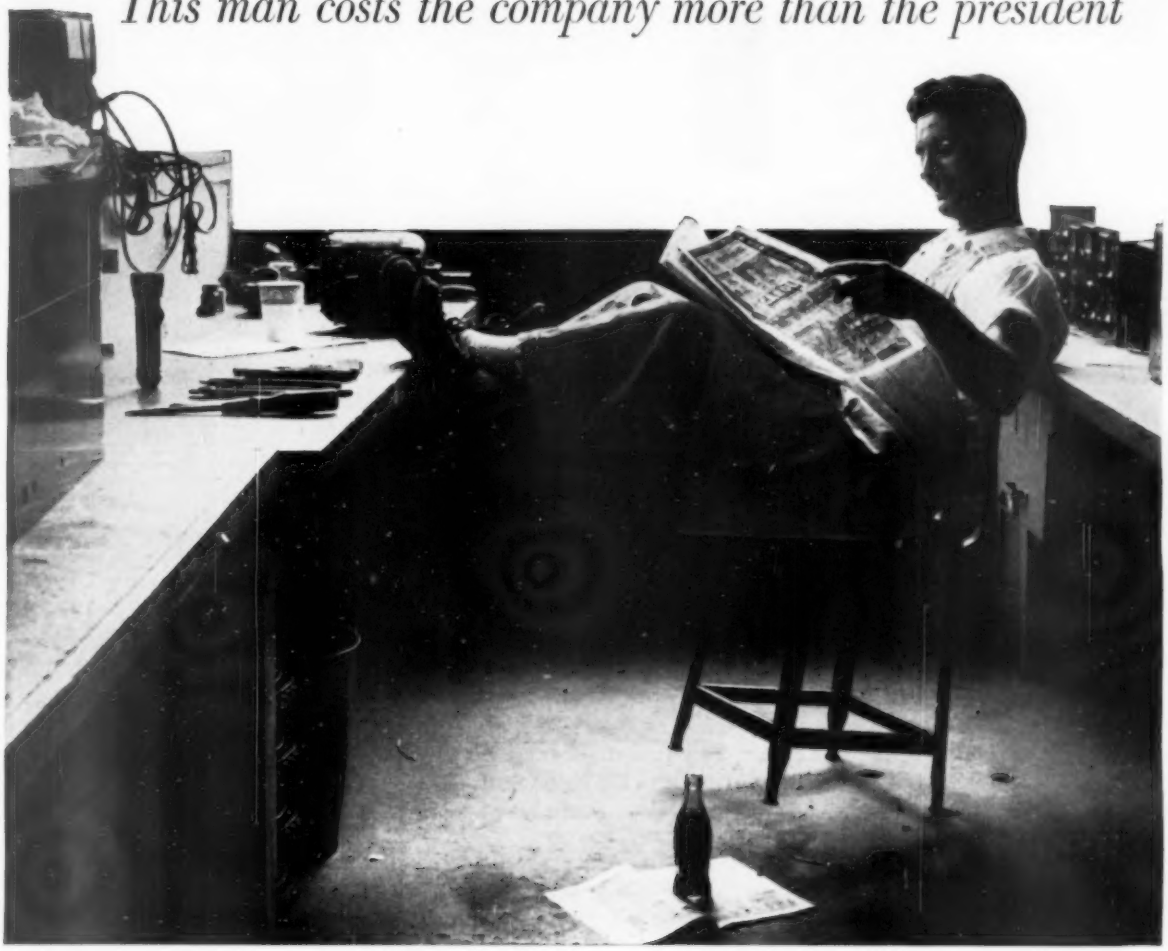
This man costs the company more than the president



At $800 a week, the company's top man is a real bargain. He works hard at the right things, gets a lot accomplished.

At $80 a week, this plant electrician (Sam's his name) is an extravagance – because he doesn't have *enough* to do.

Sam totes his tool box into a number of departments each day. Sometimes he finds work, sometimes he doesn't. When the reports come in (two weeks later), there's no sure way of telling whether he pulled his weight or not. He's chalked up to "overhead"... and a potential bit of profit gets lost in a catch-all figure. Year after year.

How to get your money's worth out of Sam? With Automatic Keysort punched-card controls. Keysort will give you a daily break-down of indirect labor (including maintenance) *by department*. Knowing the facts *on time*, you can keep costs on target by spotting wasted man-hours, pinning down undue fluctuations.

Automatic Keysort is today's only data processing system that provides a family of integrated machines and methods designed for the automatic creation and processing of original records. Speeding vital day-to-day and long-range facts essential to sound management, this unique system fits easily into your present operations... is highly flexible to future growth and expansion.

With the Automatic Keysort System, manufacturing concerns of every size can now enjoy fast, accurate data processing on either a centralized or decentralized basis. Without restrictive, complex procedures. Without specialized personnel. And at remarkably low cost.

Call your nearby Royal McBee Representative, or write Royal McBee Corporation, Data Processing Division, Port Chester, N. Y. for illustrated brochure F-2. In Canada: The McBee Company Ltd., 179 Bartley Drive, Toronto 16.

ROYAL McBEE · *data processing division*

NEW CONCEPTS IN PRACTICAL OFFICE AUTOMATION

earn a

$2,000 DIVIDEND on PAYROLL DOLLARS/YEAR

with this **new** Impactool in the hands of an operator

I-R's new ⅜" capacity Impactool has 40% more power than its predecessor. This new tool can help you achieve some quick cost reductions. If the tool operators in your plant are using older Impactools, you could increase their man-hour productivity by as much as $2000 Payroll Dollars per year for each operator, just by replacing the older tools with new I-R 804's.

Here's the way it works! Each of your tool operators probably earns about $5000 a year, but let's say he uses the tool 50% of his time. So $2500 of his annual wage is chalked up to tool operation. By boosting his productivity 40%, you are actually increasing his man-hour output by $1000 Payroll Dollars (40% x $2500). This dividend, or extra man-hour output, possible without adding to your present payroll, is your *Dividend on Payroll Dollars*. If you have 10 operators, that's a $10,000 Dividend.

The best way to fight today's higher production costs is to take the limitations off your man-hour output, and start earning your Dividend on Payroll Dollars.

The fastest, easiest way to do this is to call your Ingersoll-Rand Branch Office today! Or write Ingersoll-Rand, 11 Broadway, New York 4, N.Y.

Ingersoll-Rand

Tools plus AIRengineering increase output per man

8-909

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BALLYMORE "Hi-boy" LADDERS

have exclusive PYRAMID design and automatic BALLYLOCK floor locking

ALL-WELDED STEEL FOR REACHING HEIGHTS UP TO 15 FEET

For complete information, write:
BALLYMORE COMPANY
WEST CHESTER 23, PA.

BALLYMORE

EQUIPMENT FOR ABOVE-FLOOR SAFETY

LOOK FOR THIS LABEL TO BE SURE IT'S THE BEST

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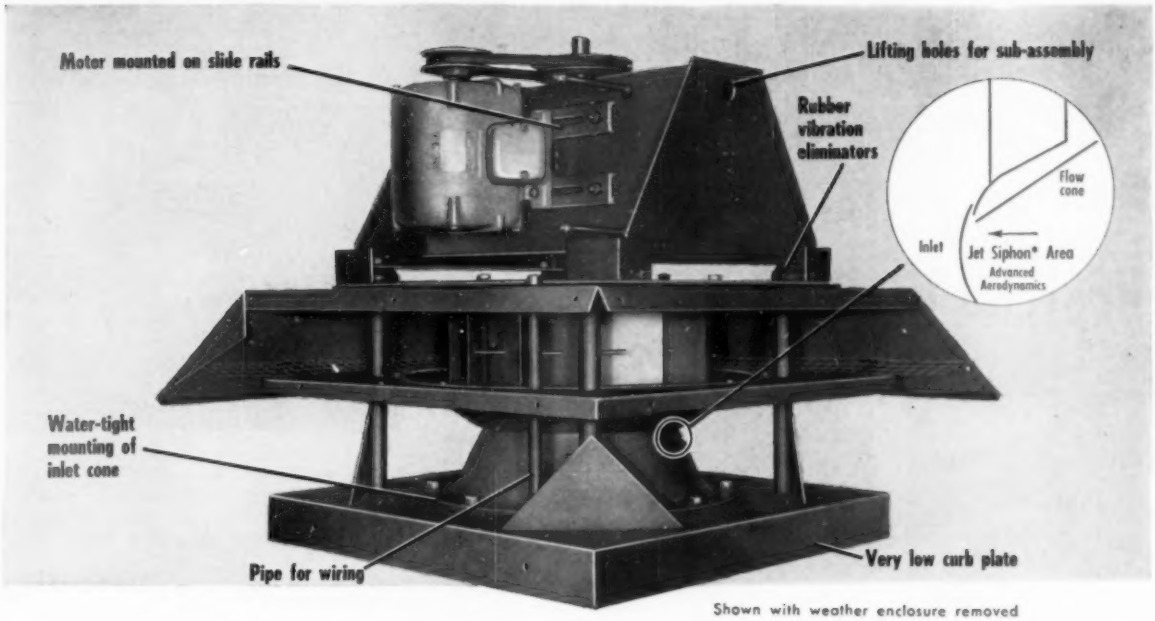


Shown with weather enclosure removed

PLUS VALUES... all yours in the Clarage Centrilator

POWER ROOF VENTILATOR — CENTRIFUGAL TYPE

Jet Siphon* feature for stable, high efficiency.

Static pressures to 2" — thus well suited to both light-duty installations without ductwork and applications where ductwork or hoods impose considerable resistance.

Adaptable to a wide range of motor sizes.

Variable pitch V-belt drive.

Wheel and inlet designed for streamlined air flow.

Built heavy-duty throughout to assure long-lasting, trouble-free service.

Every wheel statically and dynamically balanced on precision machines.

Inspection panel and complete accessibility.

Low overall height.

Venting of motor and drive area.

Engineered and constructed for extra quietness.

Heavy-duty anti-friction bearings.

Simple installation — only 4 bolts required.

Write today for Bulletin 550. Clarage Fan Co., Kalamazoo, Mich.

CLARAGE

*Patent applied for

...dependable equipment for making air your servant

SALES ENGINEERING OFFICES IN ALL PRINCIPAL CITIES • IN CANADA: Canada Fans, Ltd., 4285 Richelieu St., Montreal

As original system equipment in new buildings or to renovate old plants...

WHY INSTALL MORE HEATERS THAN YOU NEED?

You can cut the number of heaters needed for most systems in half by using Carrier "Clover-Leaf" Heaters. One of these 4-way units does the work of two or more conventional units. So installing a Carrier system requires fewer units as well as fewer system accessories that demand service attention. Your installation costs are lower—your maintenance costs are lower, too. Carrier "Clover-Leaf" Unit Heaters are available for steam or hot water in 8 sizes from 85,000 to 600,000 Btu/hr.

For "tight" places or spot heating

Carrier offers horizontal discharge models featuring rear pipe connections for installation adaptability. In 10 sizes, from 13,000 to 200,000 Btu/hr. Conventional down-blow heaters also available in a complete range of sizes for special application.

If you are planning a new building or renovating your old heating system, call your Carrier Unit Heater agent or wholesaler. Since they sell Carrier's complete line of steam, hot water and gas-fired unit heaters, their only concern is to recommend the equipment best suited for your needs. They are listed in the Classified Telephone Directory under "Heaters—Unit." Carrier Corporation, Syracuse, New York.

Carrier

Air Conditioning
Refrigeration
Industrial Heating

For more facts Circle 617 on Reader Service Card

Clarke POWER SWEEPERS

—do the work of up to 20 men!
—cut sweeping costs up to 80%!

It's Clarke's newest addition to the nation's best known line of floor machines. It's built to sweep cleaner, faster and more dust-free than any other sweeping method. Picks up all types of debris, covers up to 50,000 sq. ft. per hour, sweeps right up to walls, maneuvers easily, slashes man hours and sweeping costs.

Write for new brochure. Better yet, ask your Clarke power sweeper distributor for an on-the-job demonstration.

CLARKE FLOOR MACHINE COMPANY
Formerly Clarke Sanding Machine Company
763 E. Clay Avenue, Muskegon, Mich.
Authorized Sales Representatives and Service Branches in Principal Cities. In Canada: Clarke Floor Machine Co., (Canada) Ltd., 21 Advance Rd., Toronto 18, Ontario

For more facts Circle 618 on Reader Service Card

Paint on Fire Protection!

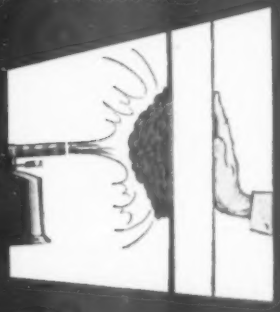
with decorative

Saf
"stops all fires"
Trade Mark

FIRE RETARDANT PAINTS

Highest Ratings by far... from Underwriters' Laboratories

- STOPS FLAME SPREAD
- INSULATES
- DECORATES



Your buildings need Saf PROTECTION

...provide it as part of regular maintenance!

Write today for full descriptive information, "Paint on Fire Protection" to:

ALIM CORPORATION 11 Park Place, New York 7, N.Y. National Sales and Service

BALTIMORE PAINT AND CHEMICAL CORPORATION
2325 Annapolis Avenue Baltimore 30, Maryland Manufacturers

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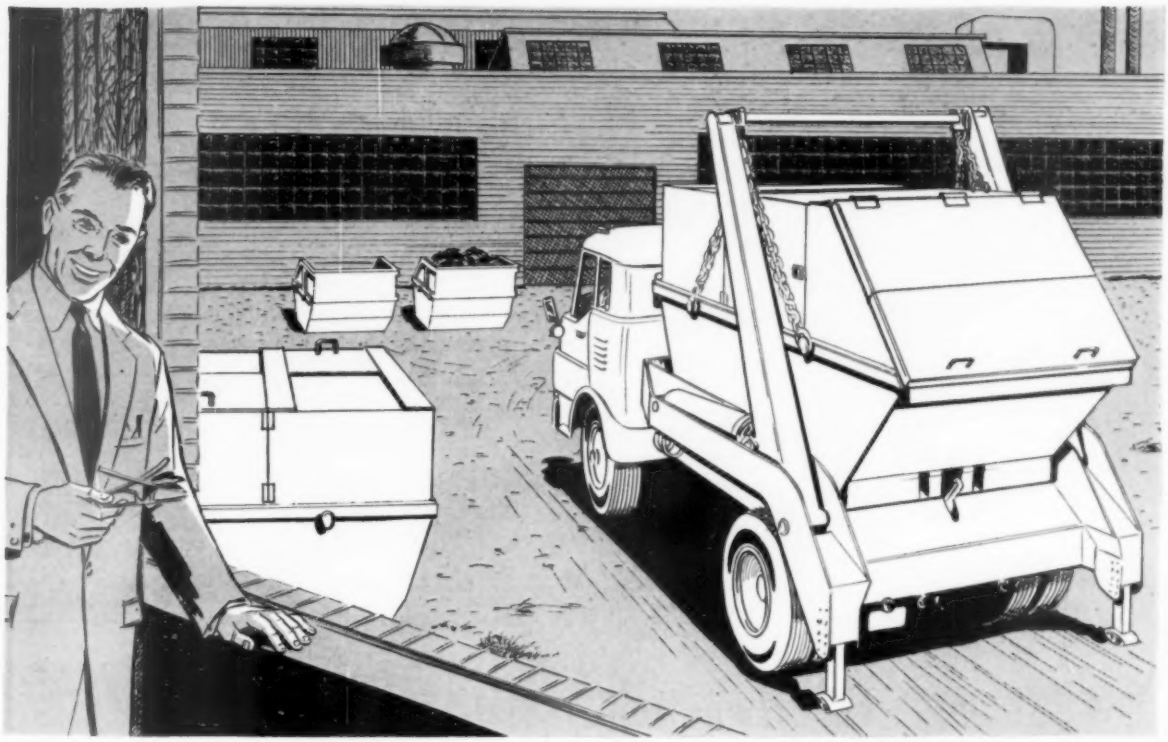


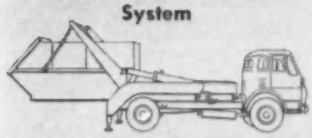
What does it cost *your* business to keep house every day?

Take a look around your plant. If rubbish is accumulated in drums or boxes you are undoubtedly paying for the labor of several men to handle them daily. Here's one of those areas where costs nibble at profits. Makeshift disposal adversely affects plant efficiency and also creates fire and safety hazards.

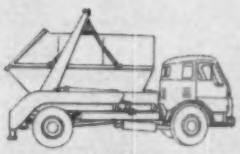
THE LOAD LUGGER SYSTEM reduces housekeeping costs as much as one-half. It helps improve plant efficiency. Where rubbish is accumulated in big Load Lugger containers*, neater premises and safer conditions result. One Load Lugger truck services many Load Lugger containers. Only one man, the driver, is needed.

It will pay you to investigate the versatile Load Lugger System today.

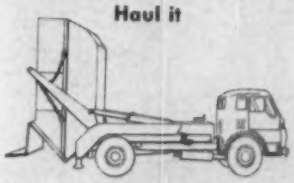
The LOAD LUGGER System



Hoist it



Haul it



Dump it

*Capacities 1½ to 16 cubic yards.

INGERSOLL KALAMAZOO® B-W BORG-WARNER

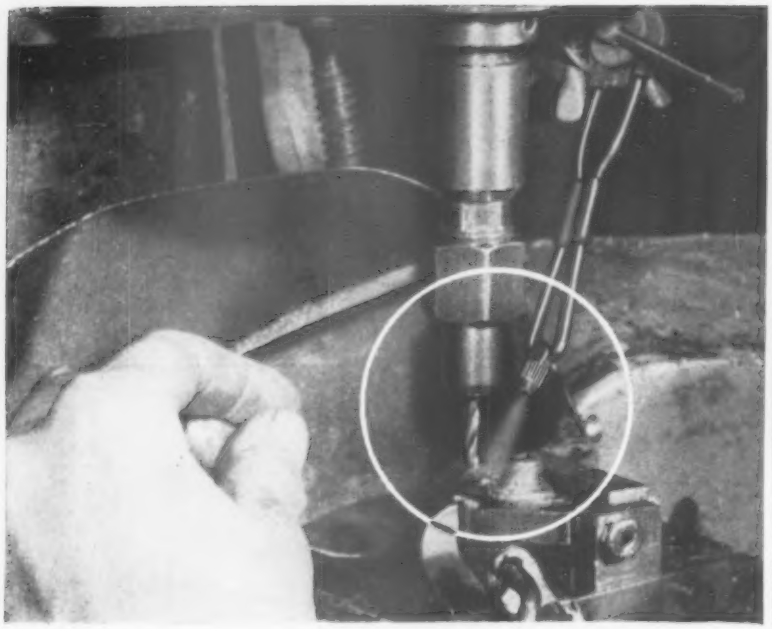
Borg-Warner® Corporation

INGERSOLL KALAMAZOO DIVISION

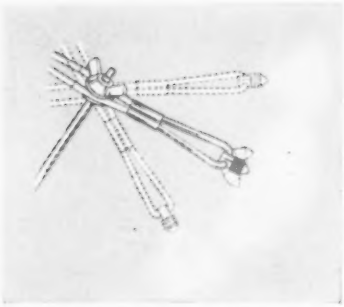
1823 North Pitcher Street, Kalamazoo, Michigan, Telephone Fireside 5-3501

EXPORT SALES: BORG-WARNER INTERNATIONAL CORPORATION, CHICAGO

Ask About Our LEASING AND FINANCING PLANS



$40 mist-spray cooling outfit lets you hold closer tolerances



Swivel tip directs fine mist spray into the critical point of cut.

Multi-Misters available with one- or five-gallon tanks, one to four nozzles.

When cutting-tool heat plays havoc with tolerances, control it *effectively* with the DeVilbiss Multi-Mister.

Multi-Mister's jet of expanding air dissipates tool heat instantly; its spray mist lubricates cutting edges to reduce friction.

The results are a matter of record. For, in actual use, the Multi-Mister has made possible greater machine speeds, finer surface finishes while holding closer dimensional tolerances —with fewer shutdowns to sharpen and reset tools. And it often doubles tool life! Complete outfits start at $40; attach quickly and easily to any machine.

Call your DeVilbiss supplier, today, for full details; or write us direct for Multi-Mister Bulletin BC 1025.

THE DEVILBISS COMPANY
Toledo 1, Ohio
Barrie, Ontario • London, England • São Paulo, Brazil
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FOR BETTER SERVICE, BUY
DEVILBISS

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- ☆ Gives Graphic Picture — Saves Time, Saves Money, Prevents Errors
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GRAPHIC SYSTEMS

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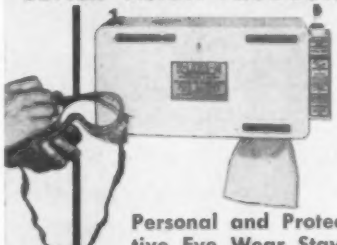
CUT GOGGLE CLEANING COSTS with K-LENS-M

REG. U.S. & CAN. PAT. OFF.

BETTER VISION PRODUCTS



The Modern Liquid Method Cleans and Anti-Fogs Glass or Plastic

Personal and Protective Eye Wear Stays Clean Longer with K-Lens-M at Lower Cost per Cleaning.

For **FREE** *Sample: send company letterhead*

The **WILKINS Co.,** Inc.
Cortland 41, N. Y.

Wise to Choose — Safe to Use

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Circle 623 on Reader Service Card

Use your AIM*...The Trane Company did...

Steel Strapping Machine Improves Packaging

THE TRANE COMPANY, LA CROSSE, WISCONSIN, makers of heating and air conditioning equipment, sought a better, faster way of applying steel strapping to shipping fibre containers and wood crates. Their Acme Idea Man introduced them to the Acme Steel F1 semi-automatic strapping machine. (Idea No. S1-6)

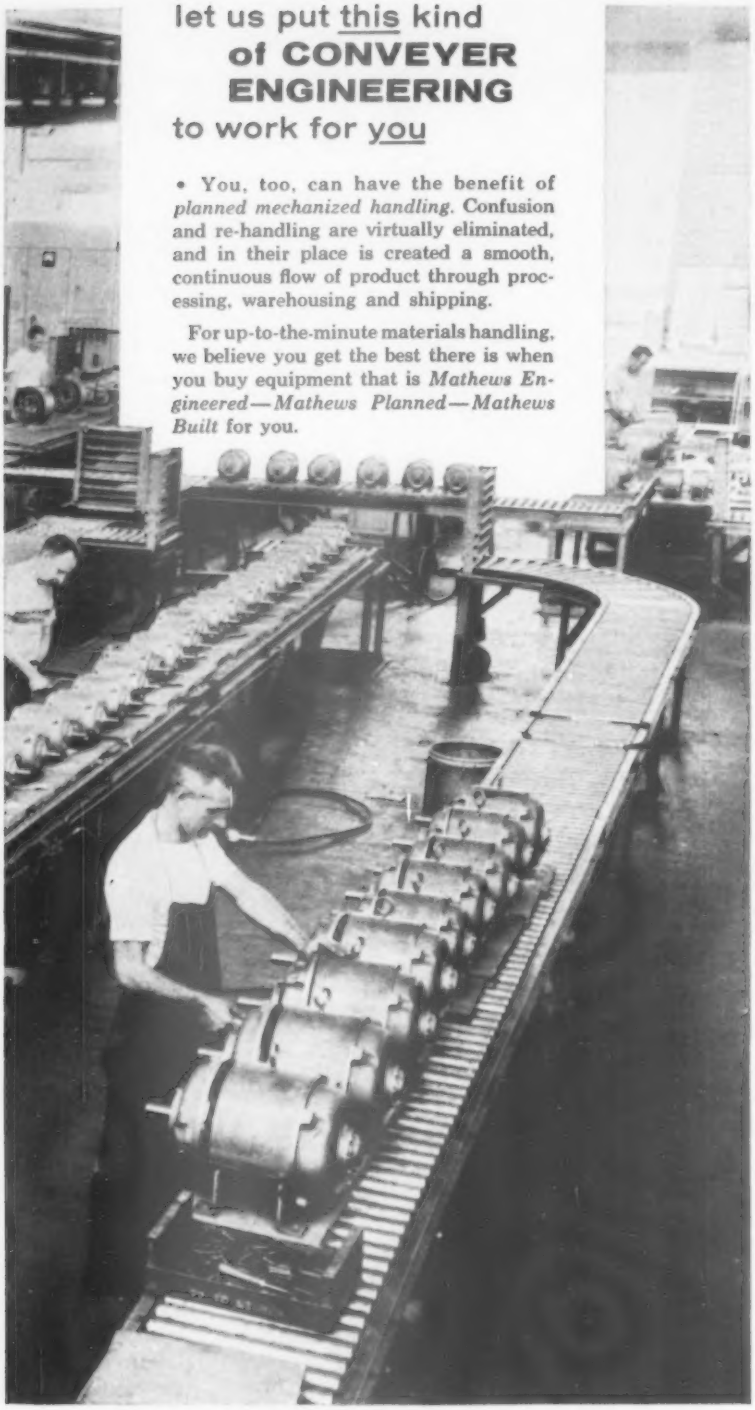
Today, one man easily handles this complete new strapping station. With finger-tip controls and maximum speed, the F1 tensions the strap, cuts it without waste and double spot welds the ends together. And with the F1 fibre boxes and crates of widely varying sizes can be strapped without costly, time-consuming machine adjustments.

Now, with steel strapped containers, Trane products are sure to travel in complete security and arrive intact. Both producer and customer benefit from this improved packaging procedure.

Acme Idea Man John McEvoy helps Trane and many other companies solve packaging and shipping problems.

***Use Your Acme Idea Man** as a skilled source for profitable ideas on how to solve your packaging and materials handling problems. Call him or write Dept. FAS-39, Acme Steel Products Division, Acme Steel Company, Chicago 27, Ill. In Canada, Acme Steel Company of Canada, Ltd., 743 Warden Ave., Toronto 13, Ontario.

ACME STEEL **STEEL STRAPPING**



let us put this kind of CONVEYER ENGINEERING to work for you

• You, too, can have the benefit of *planned mechanized handling.* Confusion and re-handling are virtually eliminated, and in their place is created a smooth, continuous flow of product through processing, warehousing and shipping.

For up-to-the-minute materials handling, we believe you get the best there is when you buy equipment that is *Mathews Engineered—Mathews Planned—Mathews Built* for you.

MATHEWS CONVEYER COMPANY

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PACIFIC COAST DIV. . . . MATHEWS CONVEYER COMPANY WEST COAST, SAN CARLOS, CALIFORNIA
CANADIAN DIVISION . MATHEWS CONVEYER COMPANY, LTD., PORT HOPE, ONTARIO.

MATHEWS

Over Fifty Years of Leadership in Mechanized Handling

MICRO LEVER DOLLY

a low cost safe tool to move heavy objects

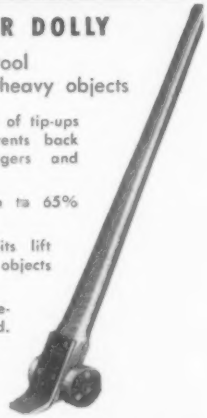
Eliminates the danger of tip-ups and high falls. Prevents back sprains, crushed fingers and pulled muscles.

Cuts moving time up to 65% on large bulky items.

Correct design permits lift blade to pry under objects flat to the floor.

High leverage ratio between power and load.

Four sizes. Metal or rubber wheels. See local distributor or write to—



MICRON, INC., Bettendorf, Iowa

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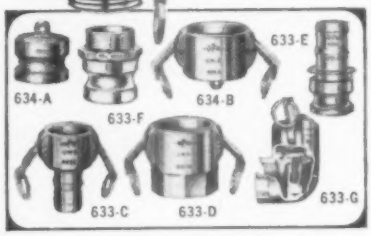
OPW KAMLOK

BRONZE • ALUMINUM • MONEL
STAINLESS STEEL • SEMI-STEEL

SLIPS ON . . .
CAM TIGHTENS
NEVER FAILS
HOLDS TIGHT



BRONZE • ALUMINUM • MONEL
STAINLESS STEEL • SEMI-STEEL

All styles of adaptors fit in all styles of couplers of the same size.

Write for Free Bulletin F-10

JORDAN CORPORATION

DIVISION OF OPW CORPORATION

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ELmhurst 1-1352

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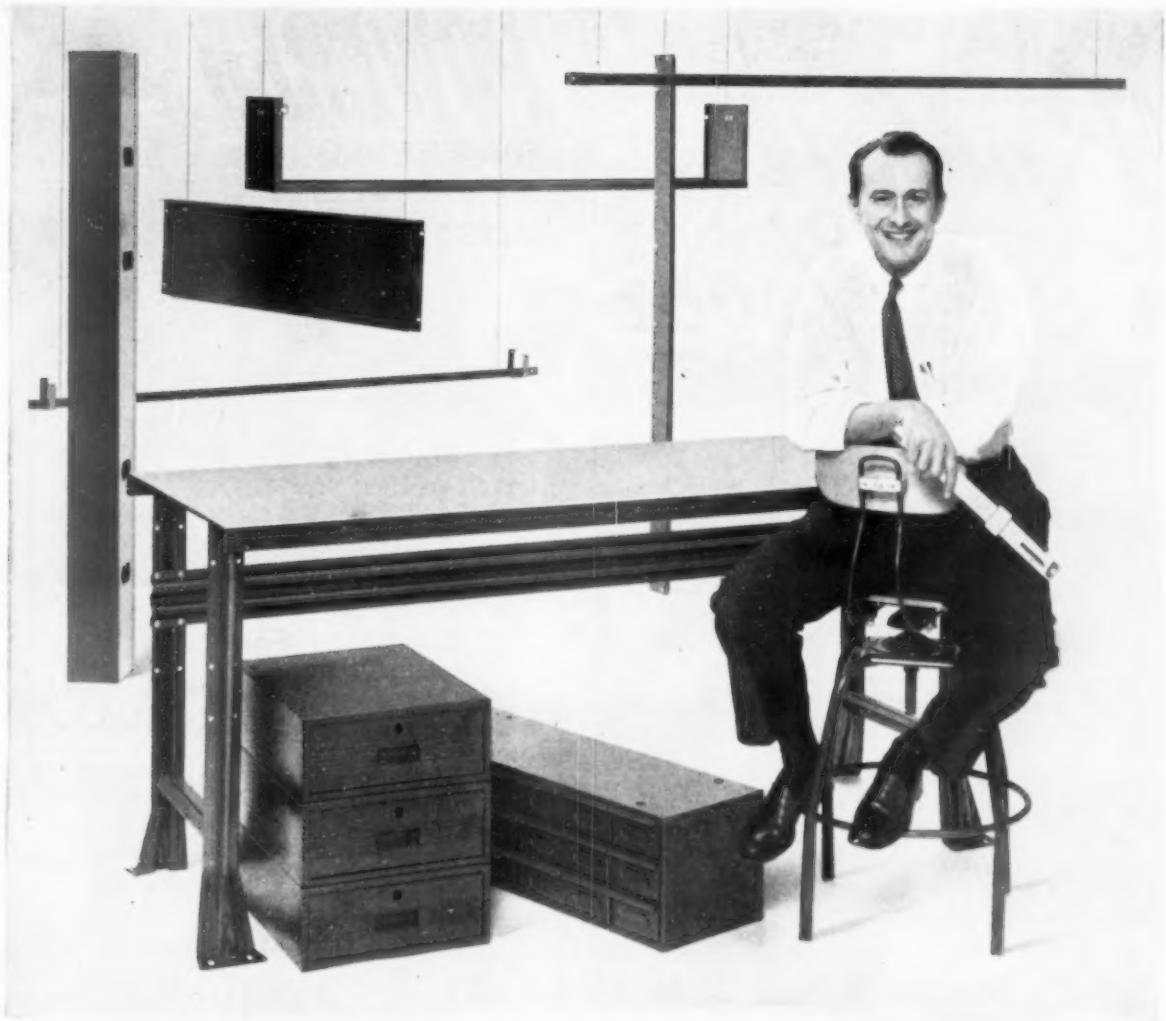

You can do almost anything with a Hallowell bench

Custom-built benches for assembly areas, soldering, inspection, tool rooms, laboratories, model shops and other uses needn't carry special equipment price tags. With Hallowell standard work bench variations, you can install a full range of special equipment, at standard bench prices.

Make changes as you need them. Add accessories, drawers, cabinets, electrical equipment easily and quickly to meet changing requirements. Re-equipment costs are kept to a minimum because you buy only the additional parts and accessories you need.

Make a sound investment. Hallowell Steel Equipment doesn't become obsolete. It has almost unlimited adaptability to new and different uses. And its ruggedness is your assurance of long-lasting value.

CUSTOM-TAILOR HALLOWELL OPEN BENCHES TO YOUR SPECIFIC NEEDS

Add drawers . . . or an electrical panel . . . drawer tiers . . . lower shelves . . . or a top shelf . . .

. . . or combinations of these and many other accessories available from stock.

There's an authorized Hallowell distributor near you who will be glad to show you the complete Hallowell line. Get in touch with him, or write Columbia-Hallowell Division, SPS, Jenkintown 11, Pa. or SPS Western, Santa Ana, Calif.

SPS

Jenkintown • Pennsylvania

Standard Pressed Steel Co. • The Cleveland Cap Screw Co. • Columbia Steel Equipment Co. • National Machine Products Co. • Nutt-Shel Co. • SPS Western • Standco Canada, Ltd. • Unbrako Socket Screw Co., Ltd.

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WHY IT PAYS TO USE

Rubbair® Door

the true door — not a curtain,

One of several Rubbair Door installations at the Strathmore Paper Co., West Springfield, Mass.

STRATHMORE

READ THIS ACTUAL CASE HISTORY—

"The installation of Rubbair Doors has really solved three problems for us," said Mr. J. S. Mudgett, Chief Engineer, Strathmore Paper Co., West Springfield, Mass. "The first problem was the necessity for a door that would permit a free flow of heavy fork-lift truck traffic without requiring a stop to mechanically operate a conventional type door. The second problem was considerable heat loss to open warehouse area which was reduced by fast closing action and air seals. The third problem was maintenance costs which have been reduced because of the flexibility of the door. Of course, other benefits have been realized such as safety for workmen as well as a considerable reduction of dust and dirt from the loading platform."

RUBBAIR® DOORS Assure Trouble Free Operation With

- Flexible con-truction
- Safety-cushion nose
- Scuff-resistant wear panels
- Rugged V-eam hinges
- Positive air seal
- Shatter-proof windows

If you have an industrial door maintenance problem, let us help you solve it. Write us the details or send for a free illustrated catalog.

Stic-Klip®

MANUFACTURING CO., INC.
RUBBAIR® DOOR DIVISION
60 Regent Street
Cambridge 40, Massachusetts

POWERED SWEEPING AT LOWEST COST

ROTA-BRUSHES SWEEP 40" PATH

The fastest way to sweep all litter and debris. 50,000 sq. ft. per hour. Easy to maneuver around boxes, crates and aisles. Saves time and money!

FREE DEMONSTRATION

Write for free booklet . . . no obligation

2¼ H. P. 4 CYCLE ENGINE

Parker FLOOR SWEEPERS

another achievement of

PARKER SWEEPER COMPANY

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FACTORY

MANAGEMENT AND MAINTENANCE

330 West 42nd Street, New York 36, N. Y.

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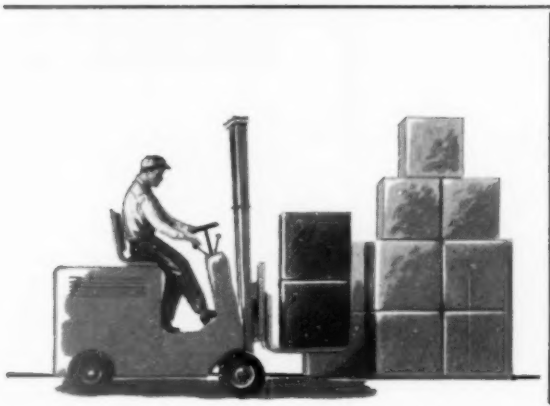
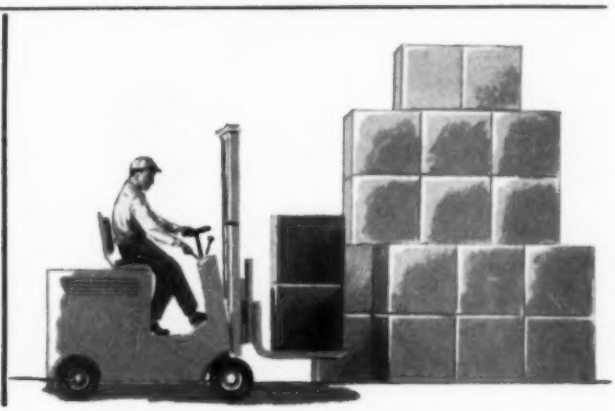
YOUR Electric Truck BATTERY

Exide Industrial Division, The Electric Storage Battery Company, Philadelphia 20, Pa.



Equip any electric industrial truck with an Exide-Ironclad Battery . . .



. . . and you boost its work capacity . . . earn a bigger investment return.

EXTRA POWER IN EXIDE-IRONCLAD GETS YOU MORE WORK FROM YOUR PRESENT SIZE FLEET

Put a more powerful battery in any electric industrial truck and you boost its work capacity. Multiply the boost by the size of your fleet and you get an idea of just how much more valuable Exide-Ironclad Batteries can make your trucks.

Each Exide-Ironclad Battery now packs at least 25%, up to 44%, more power than the most powerful truck batteries previously sold. So if you want more truck work capacity, you can get it from your present size fleet. Equipped with new Exide-Ironclad Batteries, each of your present trucks can handle more per shift, move it farther, work longer hours . . . in other words, they can do more, much more, than they ever did before.

Improved battery construction

Exide-Ironclad tubular plate batteries have proved their superiority in thousands of applications. Today they feature new, more advanced tubular construction that dramatically improves performance and extends life potential. This is the latest step forward in the 50-year progress of Exide-Ironclad Batteries. The new armored porous tubing holds the active material even more firmly captive against loss. Greater porosity improves access of electrolyte for sustained high-load capacity. And inside, where vital current flows from the positive plates, Exide's patented Silvium alloy resists corrosion as much as 100% longer than other commonly used alloys.

Now each positive plate in Exide-Ironclad Batteries packs more power into the same battery space. Battery materials are used more efficiently for greater power per dollar. Here, truly, is today's outstanding battery value for electric industrial trucks.

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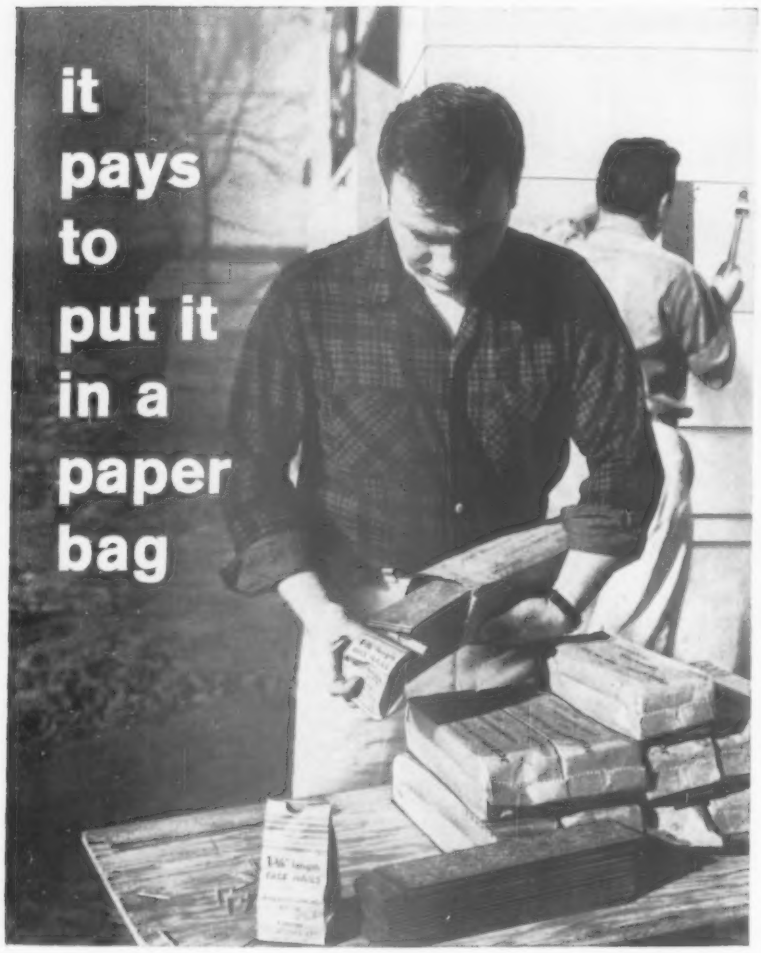

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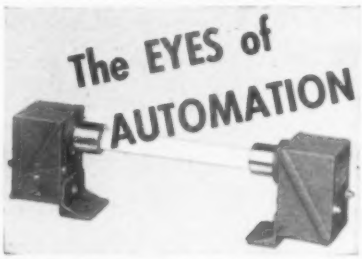

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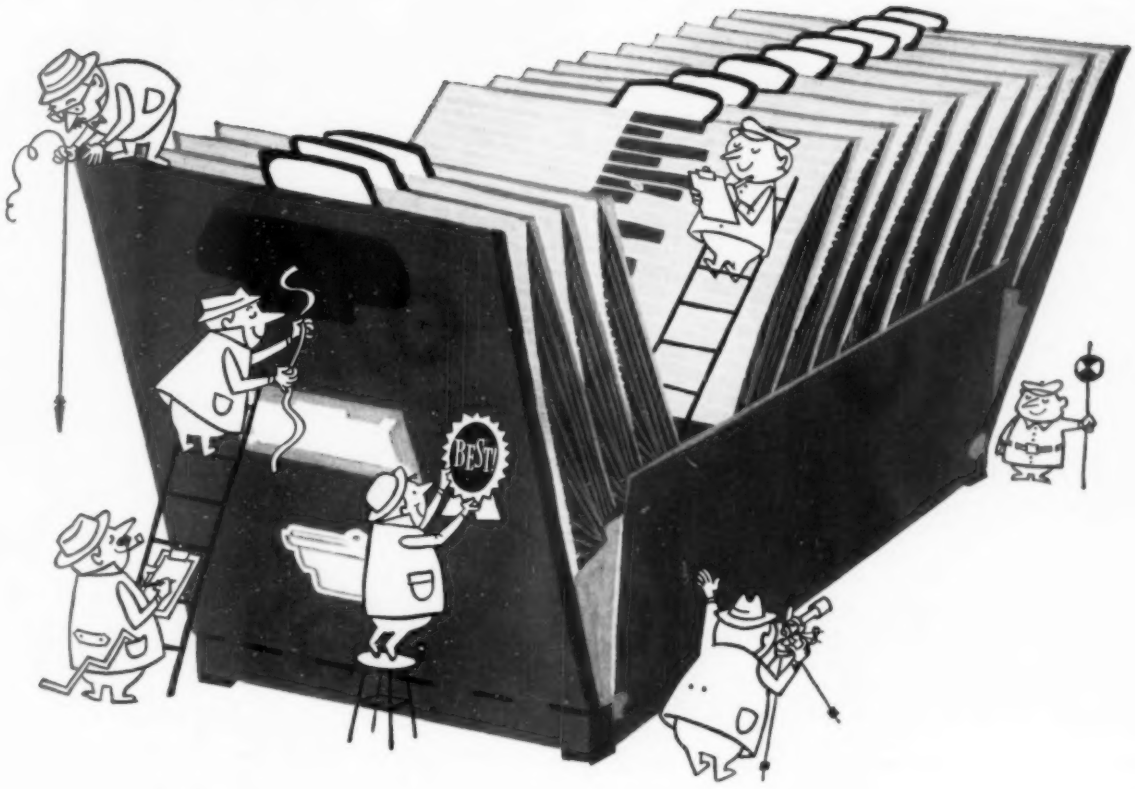

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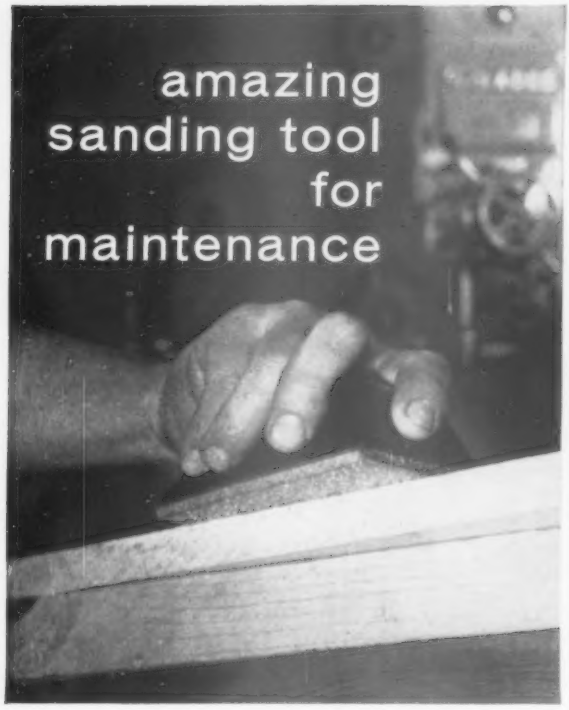

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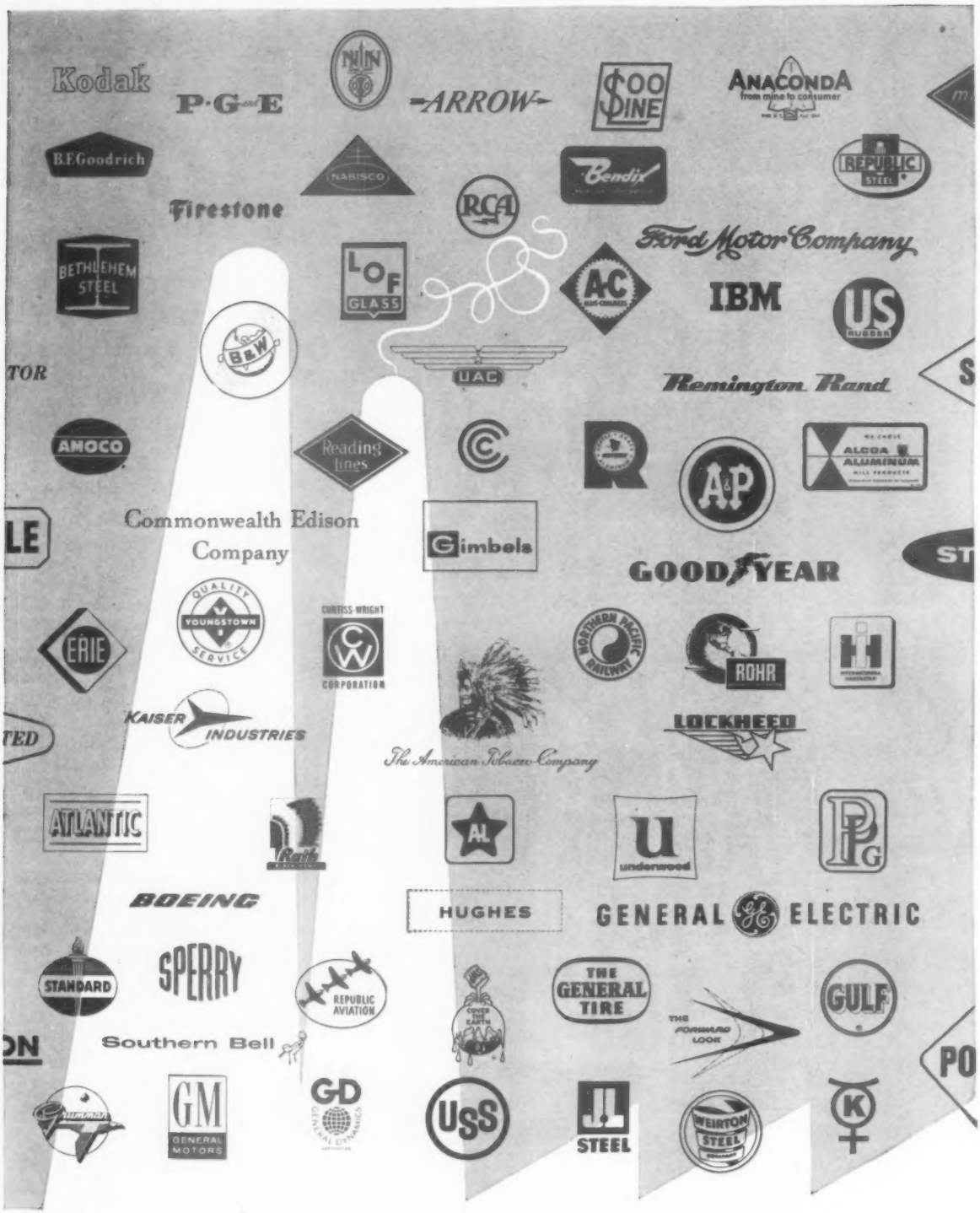

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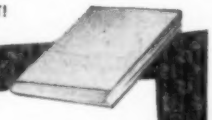

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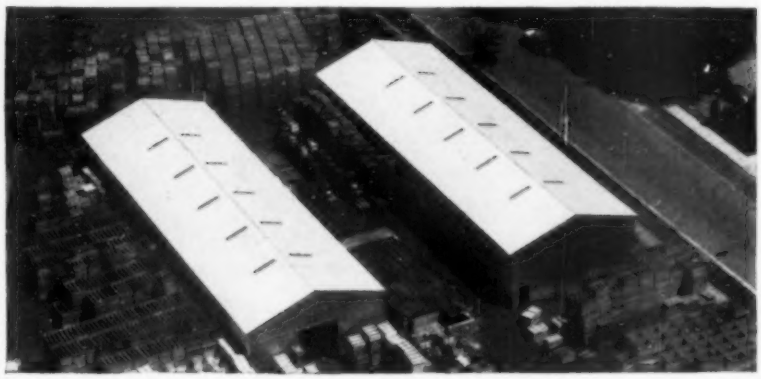

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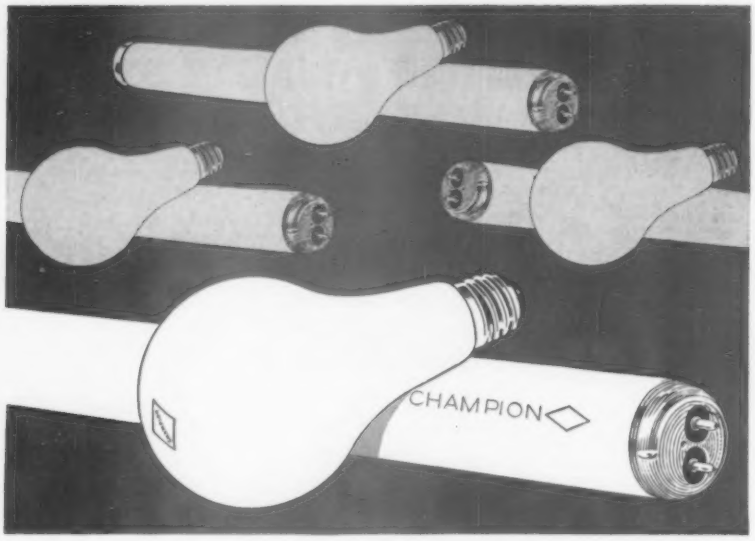

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A REPORT TO MANAGEMENT ON HOW

Industry cuts costs with FIR PLYWOOD

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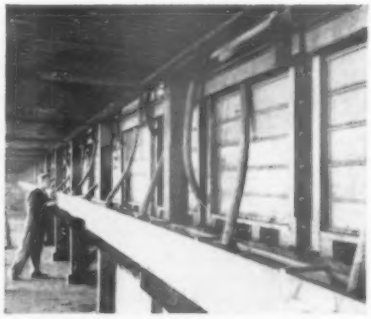
Fir plywood roof decking saved $3,000 on this 25,000 square foot elementary school in Tacoma, Washington, and helped bring the job in well under the original bid. With the architects' approval, the contractor switched from two-inch T&G lumber after cost studies showed that substantial savings could be made by using ¾-inch fir plywood.

While most of the savings came in labor and material, some ten to fifteen per cent came in the use of metal "H" clips which replaced lumber blocking in supporting panel edges. The clip idea points to new opportunities in reducing costs on commercial and industrial buildings as well as schools. Clips are available nationally; write for details.

Fir plywood pallets give extra capacity, last longer and save 9 lbs. per unit at Heidelberg Brewing Co. The firm has used over 5,200 since 1952; it reports plywood has eliminated pallet failure. Repair costs are negligible. Write for DFPA report on design and use of plywood in pallet construction.

Switch from aluminum to fir plywood for these "bottomless boxes" saves $5,000 per year in maintenance and replacement costs for Keeney Truck Lines, Los Angeles. Collapsible boxes have sides, no bottom. They slip over palletized bricks to hold them securely in position during handling, shipping.



Over $30,000 savings in four years was made by switching to overlaid fir plywood for these electro-plating cells. The plywood acid tanks cost only $140 each—$400 to $600 less than rubber-lined steel tanks. Plywood also solved leakage problem which has been encountered with the lumber tanks.

FOR MORE INFORMATION about fir plywood—its uses, properties and advantages—write

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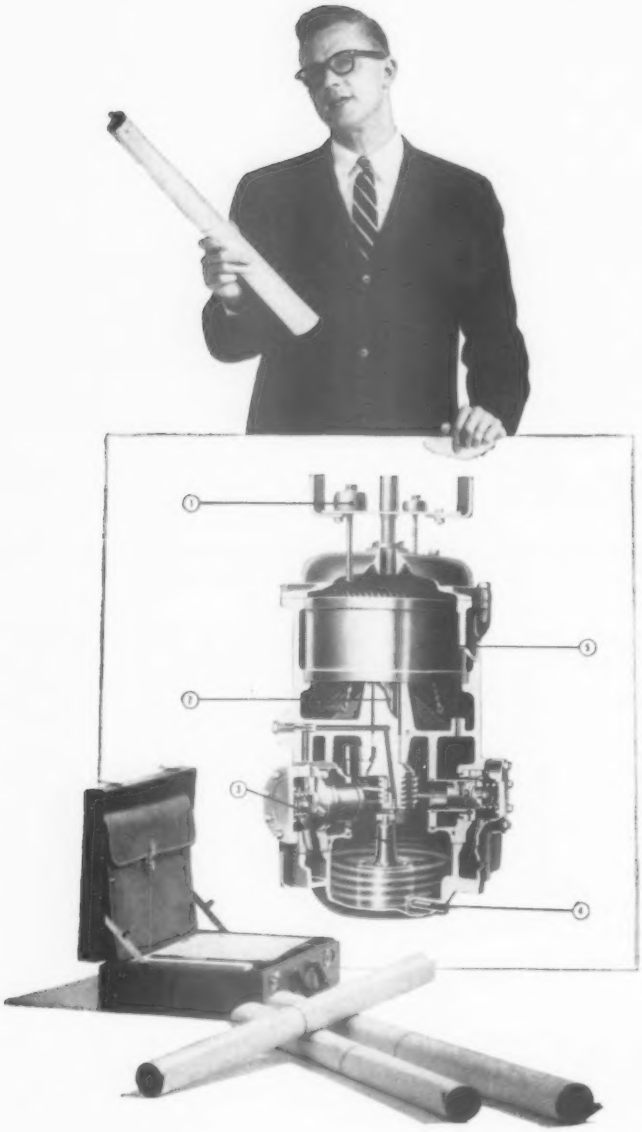

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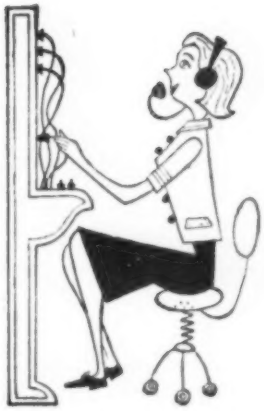

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ADVERTISEMENTS —	446	447	448	449	450	451	452	453	454	455	456	457	458	459	460	461	462	463								
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MARCH 1959 —1

This card serviced only if received before end of June, 1959

Catalogs in This Issue

To help you, here is a list of catalogs described in this issue. To obtain, circle key numbers on either postcard.

MATERIALS HANDLING

1—Bins, Tanks, Tilts
2—Power Drive for Lift Trucks
3—Chain Sling Links
4—Truck Batteries
5—Portable Elevators
6—Jib Cranes
7—Roller Gravity Conveyors
8—High-Lift Stackers
9—Cranes
10—Casters and Wheels
11—Electric Chain Hoists

VALVES AND PIPES

12—Solenoid Valves
13—Finger-Flexible Hose
14—Plastic Pipe
15—Hose Assemblies
16—Control Valves

MAINTENANCE

17—Mechanical Seals
18—Boiler Cleaning
19—Lubrication Systems
20—Backhoe-Loader
21—Dialysis System
22—Incinerators
23—Mountings

PLANT SITES

24—Mississippi
25—Dallas Fort Worth
26—New York State
27—Johnstown, Pa.

ELECTRICAL

28—Magnetic Starters
29—Metal-Clad Switchgear
30—Switches
31—Connectors
32—Electrical Feedrail
33—Circuit Breakers

INSTRUMENTS AND CONTROLS

34—Saturable Reactors
35—Temperature Controls
36—Dial Thermometers
37—Monitor Units
38—Automatic Count Control
39—Recorders, Controllers
40—Spectrophotometers
41—Comparators

AUXILIARY

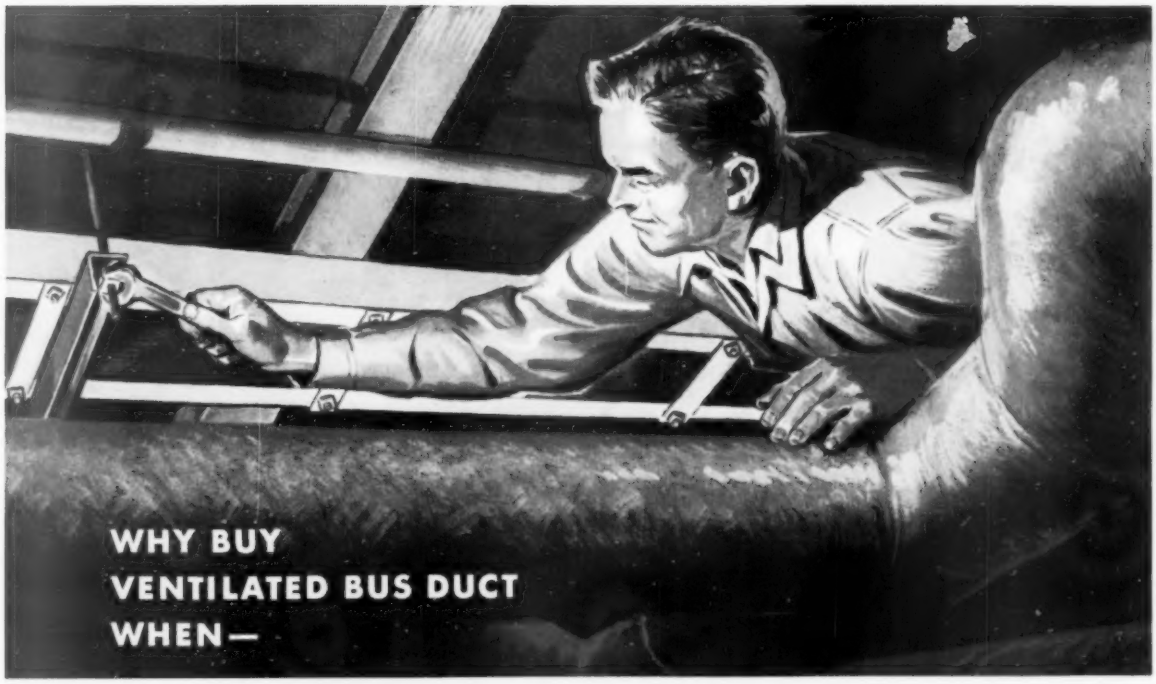
42—Mechanical filters
43—Air Compressors
44—Gas Regulators
45—Utility Pumps
46—Roof Ventilators
47—Air Handlers, Conditioners
48—Filters for coolants

PRODUCTION

49—Phosphating Method
50—Magnetic Drill Stands
51—Welded Assemblies
52—Cutting Tools
53—Abrasive Hard-Gear Finisher
54—Forgings
55—Precision Tools
56—Lapping-Polishing Machines
57—Drilling Machines

MISCELLANEOUS

58—Copying Systems
59—High-Speed Printer System
60—Food-Service Equipment
61—Welding Equipment
62—Precision Gears
63—Integral-Shaft Sheaves
64—Architectural Aluminum



Square D TOTALLY ENCLOSED Duct*

takes less space—*and costs no more*

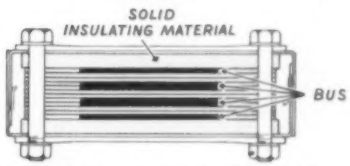
*(low impedance)

Ventilated bus duct is bulky and awkward. It's difficult—sometimes impossible—to install it in restricted areas. The layers of insulation around the bus bars and the necessary air spaces contribute to large, inconvenient size.

Square D totally enclosed feed-in duct solves the space problem. Solid sheets of insulation permit mounting bus bars only ¼" apart. This solid insulating material is also an effective heat conductor, thus eliminating the need for air spaces. The result—Square D low-impedance duct is as much as 50% smaller than ordinary duct. It can be used where no other duct fits. It makes expansion of existing electrical systems easier, new construction planning simpler. Best of all, Square D low-impedance bus duct is totally enclosed. Having no ventilation holes, it's safe from physical damage and dust accumulation. Needing no ventilation, it can be mounted in any position without de-rating.

Doesn't it make sense, when buying feed-in duct, to specify a product that will meet all your requirements? Square D totally enclosed low-impedance duct costs no more—why settle for less?

Here's Why Square D's EXCLUSIVE Design makes ventilation unnecessary

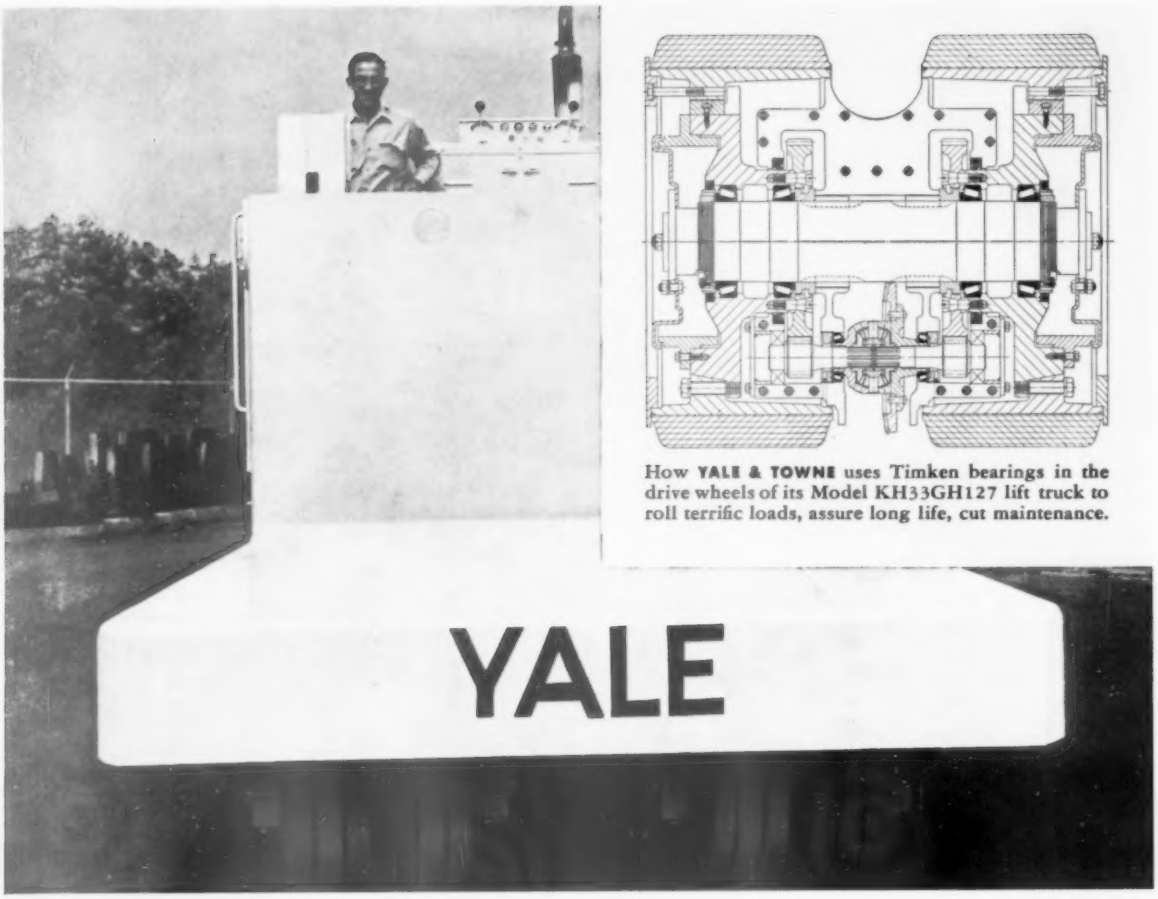


The entire space within the duct and between the bus bars is filled with a solid insulating material which conducts the heat to the surface. There are no dead air spaces inside the duct. Square D totally enclosed low-impedance duct is listed with Underwriters' Laboratories and meets U/L requirements for temperature rise in any mounting position.

EC&M HEAVY INDUSTRY ELECTRICAL EQUIPMENT... NOW A PART OF THE SQUARE D LINE

SQUARE D COMPANY

For more facts circle 447 on READER SERVICE CARD



How **YALE & TOWNE** uses Timken bearings in the drive wheels of its Model KH33GH127 lift truck to roll terrific loads, assure long life, cut maintenance.

WORLD'S HIGHEST CAPACITY LIFT TRUCK CARRIES 100 TONS ON 44 TIMKEN® BEARINGS

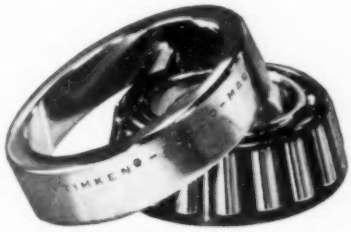
IT'S 21'4" long, has a total weight of 77,000 lbs.! The platform measures 13' by 8'. It's Yale & Towne's new Model KH33GH127 lift truck that provides 2'4" of lift hydraulically. To take the tremendous loads (up to 100 tons), keep vital parts rolling smoothly, Yale & Towne uses 44 Timken® tapered roller bearings in the trail wheels, drive wheels, pinion and differential.

Timken bearings ask no favors when rolling big loads. Full-line contact between their rollers and races provides extra load-carrying capacity. The tapered construction of Timken bearings lets them take both radial and thrust loads in all combinations. And rollers and races are case-carburized to produce hard, wear-resistant surfaces over tough, shock-resistant cores.

Timken bearings practically eliminate friction. They're geometrically designed and precision-made to have true rolling motion. They *roll* the loads—help any machine operate smoother and longer with minimum maintenance. And they normally last the life of the machine.

For extra quality control, we even make our own electric furnace fine alloy steel. Timken bearings help any machine run better. And better machines make better products—do better work. That's Better-ness. Look for the trade-mark "TIMKEN". It's your symbol of Better-ness. The Timken Roller Bearing Company, Canton 6, Ohio. Canadian plant: St. Thomas, Ontario. Cable address: "TIMROSCO". Makers of Tapered Roller Bearings, Fine Alloy Steels and Removable Rock Bits.

This symbol on a product means its bearings are the best.



BETTER-ness rolls on TIMKEN® tapered roller bearings

For more facts circle 448 on READER SERVICE CARD